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THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME XLIV.—No. 5. Whole No. 841. | NEW YORK, TUESDAY, MARCH 2, 1886. | $3 PER ANNUM IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
JOS. R. THOMAS, C.E., Editor.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND CLASS MATTER.

Published on the 2d and 16th of each month, at No. 42 Pine Street, N. Y.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $3.50 (15 shillings—18 francs). All payments to be made in advance. Single copies, 15 cents.

Remittances should be made either by post-office order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

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[OFFICIAL NOTICE.]

Second Annual Meeting of the Ohio Gas Light Association.

COLUMBUS, OHIO, February 15, 1886.

To the Members of the Ohio Gas Light Association:—The following papers will be read at the Second Annual Meeting of this Association, which will occur at Springfield, Ohio, March 17th and 18th, 1886:

1. President's Address, including remarks on "State and Municipal Legislation Governing Gas Companies," Gen. A. Hickenlooper, Cincinnati, O.
2. "The Financial Relations of Gas Companies and Consumer," Thomas Wood, Superintendent Sandusky Gas Company, Sandusky, Ohio.
3. "Retort House and Benches," J. Anderson, President and Manager Standard Gas Retort and Firebrick Company, Ironton, Ohio.
4. "Comparative Value of Coals for Gas Making," E. McMillin, Engineer and General Manager Columbus Gas Light and Coke Co., Columbus, O.
5. "The Use and Relative Merits of Coke, Tar, and Gas for Heating Retorts," Joseph Light, Superintendent Dayton Gas Light and Coke Company, Dayton, Ohio.
6. "Gas Company Accounts," A. B. Robinson, Secretary Columbus Gas Light and Coke Company, Columbus, Ohio.
7. "Prevention of the Formation of Carbon in Retorts," John Fullager, Engineer Cincinnati Gas Light and Coke Company, Cincinnati, Ohio.
8. "An Experience with Air in Gas Mains," Eugene Printz, Superintendent Zanesville Gas Light Company, Zanesville, Ohio.
9. "What is the Loss in the Illuminating Power of Coal Gas by the Exclusive Use of Oxide of Iron for Purification?" J. Gwyn, Superintendent of Fostoria Gas Light Company, Fostoria, Ohio.
10. "What Must Gas Companies Do with the Electric Light?" T. A. Bates, Superintendent Circleville Gas Light Company, Circleville, Ohio.
11. "Natural Gas as a Competitor of Coal Gas for Illuminating," E. B. Philipp, Superintendent Findlay Gas Light Company, Findlay, Ohio.
12. "Gas Meters; their Use and Abuse," H. C. Thompson, Agent American Meter Company, Cincinnati, Ohio.
13. "How to Prevent Tar Passing into the Purifiers," Ed. C. Gwyn, Springfield, Ohio.
14. "Artificial Illumination; or, Gas vs. Electricity," Paper prepared by Henry G. O'Neill.

The subjects of the above papers will commend themselves as being of practical importance and full of interest to all gas men. Let every member be present at the meeting, prepared to participate in the discussions that follow the reading of the papers. A full attendance is all that is now necessary to assure the success of the meeting.

The Secretary would be pleased to hear from members who would like to have brought before the meeting any questions which are not likely to be touched upon in the discussion of the foregoing subjects.

Respectfully, IRVIN BUTTERWORTH, Sec'y.

[In connection with the above communication from Secretary Butterworth we may state, semi-officially, that the following particulars, regarding the details of the Second Annual Meeting of the Ohio Gas Association, will constitute a pretty close schedule as to the order of procedure. The Arcade Hotel has been chosen as headquarters, and the sessions will also be held at that hostelry. It is a comfortable abiding place, and no complaint can be urged as to lack of accommodation. The first day's session (Wednesday, March 17th,) will be convened at 2 P.M.; second session to be called at 7:30 P.M. Upon adjournment a lunch will be discussed. Two sessions are to be held on second day—possibly in the morning and evening. This disposition leaves the afternoon hours available for the purpose of visiting some of the large manufacturing establishments in which Springfield abounds. Notable among these latter are the gas works and shops operated by Mr. A. S. Bushnell, an active member of the Association. Future exigencies may somewhat change this programme; but, in the main, the above affords a reliable outline. The outlook for an exceedingly useful meeting is of the brightest sort.]

[OFFICIAL CIRCULAR.]

Western Gas Association.

SECRETARY'S OFFICE, WESTERN GAS ASSOCIATION,
QUINCY, ILL., Feb. 20, 1886.

The Ninth Annual Meeting of the Western Gas Association will be held at Columbus, Ohio, on the 12th, 13th and 14th days of May.

This early announcement of the meeting is published for the purpose of inducing a goodly number of those upon our muster rolls to at once take the initiative steps towards presenting topics of interest for the entertainment and enlightenment of their fellow members. The generous number of valuable literary contributions which has always been presented in the past inspires us with a feeling of entire confidence for what the future may bring forth. But let no one falter nor hesitate to put in action his best effort, as regards the preparing of a paper, on account of any uneasiness lest he may find too many others in the field. A surplus of practical essays, or scientific dissertations, is always to be desired, as there will be ample time both for the reading and discussion of all papers that are likely to be presented.

The feature of a "question box" which has been introduced, although

to a limited extent, at our last two meetings, is one which seems to meet with popular favor; and it is the desire of many of our members that its sphere of usefulness be enlarged. Heretofore it has been difficult, in fact almost impossible, to induce those whose intention it is to present papers to notify us of their titles in advance of the last announcement of our meeting. It is to be hoped that more promptness will be displayed in this particular in the future. With respect to the question-box, although many of the queries are in the nature of afterthoughts, not suggesting themselves until the business sessions are in progress, yet it would be well that I should receive, at an early day, as many of those that are to be asked as is possible, so that they may be published in advance of the meeting, thus giving ample time for the preparation of more exact and satisfactory replies than if responded to in an impromptu manner.

There are now upon our Association roll book the names of 187 members in good standing. Although this would indicate a vigorous and gratifying growth, yet there are, I regret to say, a number of our Western companies that have not so far seen fit to send representatives to our annual assemblages. This would indicate that those whose duty it is to foster and encourage the Western Gas Association in every way possible, have refrained from joining our ranks on account of the expense which would be incurred by such a course, or from a failure to realize the benefits which would accrue from such action. Again do I respectfully, although none the less strenuously, urge upon the Presidents of those companies still remaining unrepresented upon our membership rolls, to see to it that their Superintendents make their first pilgrimage to our ninth annual meeting at Columbus. However, I do not believe that in all instances are the Presidents to be blamed for the absence of their superintendents from our Association gatherings. Many well-meaning but over-zealous gas makers are so fearful that something might happen, or some duty be left unperformed, during their absence, that they shrink from the thought of leaving home. Don't be unnecessarily alarmed or lose any sleep on that account, brother superintendents. Your services are doubtless valuable to your employers; but while you are indulging in a few days of pleasant and profitable recreation at Columbus, the earth will probably continue to revolve in its orbit, pretty much in the same old way, and everything pertaining to your department will be found in tidy and ship-shape order at the end of the year. "Sticking to business" is, beyond question, a most excellent thing in its way, and no better way can be found than by becoming a member of the Western Gas Association, and a regular attendant upon its annual sessions. Aside from the pleasant social experience which you are guaranteed to enjoy, you are insured the opportunity of absorbing as much information as the average gas manager is capable of holding. So, when the time arrives, and it is not far distant, turn your face in the direction of the beautiful capital city of the Buckeye State; take the swiftest train journeying thereto; and if you return home no healthier, happier or wiser for the trip, then am I a false prophet, and know not whereof I speak.

In subsequent issues of the JOURNAL will be found the announcement of the hotel chosen for our entertainment, rates, and other matters which will, I trust, be of interest to the fraternity.

Very respectfully,
A. W. LITTLETON, Sec'y.

THE PROVIDENCE MEETING OF THE NEW ENGLAND ASSOCIATION.

Those of the New York contingent who were desirous of participating in the proceedings consequent upon the 16th annual gathering of the New England Association of Gas Engineers at Providence were in a quandary as to how best to secure transportation facilities between 42d street, New York, and the Providence terminus of the "Shore line." The daily press in this city teemed with accounts of washouts and tumbled bridges; and all inquirers at the Grand Central's department of passenger transportation were greeted with the reply, "We cannot guarantee to convey you beyond a certain point;" and as that "certain point" was invariably located somewhere west or south of the Connecticut River, the extent of the promised conveyance brought slight comfort. That refers to the morning of Feb. 15th. Much diligent scanning of time-tables, backed up by persistent cross-examination of anybody and everybody possessed of information pertaining to railroad routes, brought out the comforting information that an "avenue of march," by way of the New York and New England Railroad, with line of divergence at Harbinsondom, would solve the way to Slaterville. Tuesday (16th) saw the perils of the Harlem tunnel safely braved, and from thence on to Hartford everything progressed swimmingly. Between Hartford and Providence the first gap was encountered, which was caused by the action of the Flat river bridge in obstinately refusing to maintain the proper perpendicular. The sleepers, however, were successfully negotiated, and the "tie-counting" gasmen reached in safety the "other bank" of the high-swelling Flat obstructionist. Indeed, so fairly well did the travelers move that Providence was reached only one hour behind schedule time.

When President Greenough called the Association to order it was matter for comment that the floods must have been of grave consequence in some of the localities wherein the Eastern gas men glean, as the attendance was notably affected; and many of those present seemed to be on the "anxious seat." The genial, kindly face of Mr. G. D. Cabot was not amongst the group; neither was his coadjutor, Mr. C. J. R. Humphreys, on hand. "Something must be up at Lawrence," was the universal verdict. Brother Leach, of Taunton, was another absentee; so also was Col. Armington—but from another cause; and the list might be extended to considerable length were all the missing ones enumerated. We do not wish to be understood as saying that goodly numbers were not present, for a glance at the roll-call, given elsewhere in our columns, will show an excellent attendance. But such "regulars" as the four above mentioned, in addition to Messrs. Norton and Cadwell, who were also not on the list, could not fail to make their absence felt.

The ladies' parlor of the Narragansett Hotel was occupied on the morning of the 17th by a body of earnest men who meant business, and who energetically carried that business through. Making no mention of opening routine proceedings, we come to President Greenough's address, which, as was but to be expected, is a pleasing combination of opinions put forward in excellent rhetorical style and taste. To use the President's own words, he certainly does not "blink the facts" regarding the topics discussed; and his very temperate remarks concerning the cost of manufacture of water gas are good enough argument for us in the matter of which of the two sorts of gas—coal or water—constitutes the best product to be manufactured and distributed by gas purveyors. A really fair comparison concerning the two grades will show that, everything taken into consideration, a 20-candle coal gas can be made more cheaply than an equal grade of water gas in a great majority of locations. This absurd notion of the "beauty and effectiveness" of 25 to 30-candle gas will soon take its place in its proper category. The majority of gas consumers do not desire a higher rate of hourly consumption than from three to four feet; and at that rate of burning where does the 30-candle value come in? In connection with this we would refer our readers to some interesting figures that will be found on page 128. In respect to combined operation of gas and electric lighting plants by owners of the former, we opine that *festina lente* will apply particularly well thereto. The owners of electric lighting systems are particularly anxious to foster just such practices; and in some of their recent prospectuses we note with what avidity they urge their schemes upon the attention of managers of gas companies. Undoubtedly, electric lighting has its proper field; and, at any rate, for the immediate present we would suggest they be allowed to cultivate it. Mr. Greenough well deserved the vote of thanks awarded him. His message is admirably put together, and we will venture the opinion that its "lines" will send many a member of the fraternity into the realms of earnest thought.

The papers presented at the meeting were of an unusually interesting character; and that of Mr. Prichard, on "Fuel Gas," led to a most animated discussion. With this Prichard dissection to guide them, coal gas purveyors may look with equanimity upon the future. It is to be regretted that Mr. Rollins' statistics were not given in greater detail; but when all the difficulties with which he was surrounded are noted, we feel that the verdict of "well done" will be vouchsafed him. Mr. Stiness explained anew the virtues of the "inclined hydraulic;" and it goes without saying that if his brother managers were as persevering as himself in this line of enquiry he might possibly make converts of them all. Messrs. Stedman and Slater (and their names alone are ample guarantee that the subject was thoroughly and intelligently handled) furnished interesting details on gasholder tank construction. The items as to quantities, etc., are especially valuable. The question-box, as usual, developed good fruit; but as all these subjects will appear in the course of our official report, no further allusion to them is necessary here. They may be dismissed with the remark that the Providence sessions, looked at from a purely technical standpoint, were *at least* equal in value to those of any other previous year in the history of the Association.

Mr. Jno. P. Harbison was adjudged worthy of Presidential honors, and the champion "dollar gas" man may be counted on to do justice to the Association and credit to himself. Mr. Nettleton succeeds himself to the duties of Treasurer and Secretary—an honor worthily won. The next annual meeting will be held in Boston.

On the evening of the first day members and guests to the number of 6[illegible] sat down to absorb the good things which had been provided for them by mine host of the Narragansett Hotel, at the instance of the Committee of Arrangements (Messrs. Slater, Stiness and Nettleton), and it requires no stretch of imagination to comprehend that the banquet was heartily enjoyed. One of the notable features of the feast was the attendance thereon of one of Little Rhody's most popular ex-governors—the Hon. A. H. Littlefield, who delivered some highly entertaining remarks; but perhaps the most agreeable happening at the festive board was the presentation to ex-Secretary Geo. B. Neal of a handsome and artistic bit of bronze intended to represent an Eastern necromancer of the dark Egypt of long ago. This presentation was intended as a souvenir to mark the manner in which his associates held the remembrance of his 14 years of faithful duty at the Secretary's desk.

On the second day, after some routine business had been disposed of, the members placed themselves under Mr. Slater's care. Carriages, in waiting, conveyed the party to the South and West stations of the Providence gas works. The careful detail observed at both these elegant plants shows the watchful vigilance of a master mind; and reveals the reason why such great success has attended the operation of supplying gas light to the inhabitants of that city, whose right it is to trace directly back to the life and times of Roger Williams.

[Official Report.]

Sixteenth Annual Meeting of the New England Association of Gas Engineers.

Held at the Narragansett Hotel, Providence, R. I., Feb. 17 and 18.

First Day—Morning Session—Feb. 17.

The members of the New England Association of Gas Engineers convened in annual session in the parlors of the Narragansett Hotel, Providence, R. I., at 10 o'clock of the morning of Wednesday, Feb. 17th. The President, Mr. M. S. Greenough, of the Boston (Mass.) Gas Light Company, called the delegates to order; and the Secretary, Mr. C. H. Nettleton, of the Derby Gas Light Company, of Birmingham, Conn., occupied the recorder's chair. On motion of Mr. Stiness, the minutes of last regular meeting were "taken as printed."

Applications for Membership.

Applications for membership were received from Messrs. Jas. Porter, of Greenfield, Mass., and F. H. Parker, of Burlington, Vt. The applications, in due course, were favorably reported upon, and the Secretary was instructed to cast the ballot of the Association in favor of the election to membership of the candidates named. Sec. Nettleton complied with the direction, and reported accordingly. These gentlemen were then declared elected members, and were introduced to the Association by the President.

Inviting Visitors to Witness the Proceedings.

On motion, Mr. Stiness was appointed a committee of one with instructions to wait upon those gentlemen who (while they were not active members of the Association, were yet identified with the fraternity in various capacities) were visiting Providence at this time, and invite them to take seats in the convention and witness the proceedings. Agreed to. Mr. Stiness attended to the matters entrusted to him in his usual thorough style.

Calling the Roll.

Roll call disclosed the presence of the following named members.

Honorary Members.

Joseph R. Thomas, New York City.

Active Members.

Chas. T. Frost, Rockland, Me.	Geo. B. Neal, Charlestown, Mass.
A. H. Parker, Bangor, Me.	C. F. Prichard, Lynn, Mass.
A. T. Cooper, Exeter, N. H.	Ed. G. Pratt, N. Attleboro, Mass.
L. P. Gerould, Manchester, N. H.	J. F. Rogers, Jamaica Plain, Mass.
C. L. Gerould, Hartford, Conn.	J. H. Rollins, Worcester, Mass.
H. A. Norton, Nashua, N. H.	F. S. Richardson, No. Adams, Mass.
Chas. S. Spaulding, Brookline, Mass.	W. H. Snow, Holyoke, Mass.
John Andrew, Chelsea, Mass.	D. D. Tilton, Newburyport, Mass.
Horace A. Allyn, Cambridge, Mass.	J. R. Todd, Natick, Mass.
H. A. Atwood, Plymouth, Mass.	Robt. B. Taber, New Bedford, Mass.
Oliver E. Cushing, Lowell, Mass.	A. W. Tarbell, Waltham, Mass.
H. F. Coggshall, Fitchburg, Mass.	Gideon Wood, New Bedford, Mass.
David W. Crafts, Northampton, Mass.	Z. M. Jenks, Woonsocket, R. I.
A. M. Copp, Boston, Mass.	Samuel G. Stiness, Pawtucket, R. I.
J. A. Coffin, Gloucester, Mass.	Andrew Hutchison, Providence, R. I.
Wm. B. Durfee, jr., Fall River, Mass.	Wm. A. Stedman, Newport, R. I.
F. R. Davis, Athol, Mass.	A. B. Slater, Providence, R. I.
M. S. Greenough, Boston, Mass.	Ogden Gilmor, Norwich, Conn.
J. L. Hallett, Springfield, Mass.	John P. Harbison, Hartford, Conn.
Milton Jewett, Clinton, Mass.	E. C. Learned, New Britain, Conn.
W. A. Learned, Newton, Mass.	C. H. Nettleton, Birmingham, Conn.
G. L. Manchester, E. Hampton, Mass.	F. C. Sherman, New Haven, Conn.

President's Address.

President Greenough hereupon read the annual address, which was as follows:

Gentlemen of the New England Association:—It is with pleasure that I call attention to the fact that the past year has brought with it nothing but prosperity to the companies which we represent. It is true that clouds are lowering on the horizon, so that no man can foretell the weather—not even the Washington authorities—but at present we are still working in the sunshine. In many cases there has been a marked falling off in the value of residual products; but this has been offset by the lower price of coal; so that I am inclined to think it true that there is no company in New England whose gas has not been made at least as cheaply as last year. The best indication of this fact is the steady decrease in the price to the consumer which has marked the last few years, and of which there were many examples last year. I am convinced that there would be many more if the holders of gas stock felt confident that they would be assured in the possession of a moderate dividend, and did not have a haunting suspicion that the time might come when they should get no dividends at all; and that they had, therefore, better make hay while the sun shines, and store it up against a change of weather. Under the guidance of our Massachusetts Gas Commission, however, I have a faith in better things. I believe that the law by which they were established was one of the best measures that has ever been passed in this country for the joint protection of producer and consumer. I believe that it will be the forerunner of similar legislation in other States, and that it will prove a protection to honest industry against the rapacity of some of the nomadic associations of capitalists, who wander up and down the country, like roaring lions, seeking whom they may devour. The Gas Commission in Massachusetts is still new at its work; but it has just issued an interesting account of its labors up to the present time. It has also circulated a series of questions to the gas companies which assuredly leave nothing to be complained of in regard to their thoroughness. What the Gas Commission will not know about the companies after these questions are answered will not amount to much; and although the information, as regards each special company, is confidential, I expect next year that we shall have some very interesting statistics. It is worthy of note that in no case as yet has any single company been complained of in regard to the price or quality of its gas. This shows conclusively that, as a rule, the public is not dissatisfied with the treatment it receives at our hands.

So far as can be judged from the market prices of gas stock, there is a general feeling in the community of the permanence of the business. The probability of its disturbance either by competition in gas or electricity seems to be considered to have no effect but that of increasing the price which gas stocks bring. I must confess that the prices which I have seen quoted in our papers are somewhat of a surprise to me when I consider the circumstances in which the Boston companies stand. However, in the long run, I never knew a sound gas company to be ruined by competition. The public may be a sufferer, but the gas company always comes out all right in the end. It is perhaps to a contemplation of this fact that is due the persistent and steady rise in gas stock in Boston during the past six months.

And yet the possible competition from the incandescent electric light is worthy of attention, though not of fear. It is not and never will be, in my judgment, that which its over-enthusiastic advocates have claimed. I do not believe it to be a possible thing to deliver electricity as reliably, satisfactorily, and cheaply as gas; but, on the other hand, it is useless to deny the progress which the last five years have seen. Its safety, its coolness, its entire control, and its beauty are undeniable. We are not looking fairly at the facts if we do not admit that there are many places into which it is sure to find its way. It is perfectly true that its coolness rather hinders than helps ventilation, if compared with scientifically managed gas; but we all know that gas is not often managed scientifically, and that to many people the relief from its products of combustion is immense. It is true that its coolness is sometimes a great drawback. I have heard of a party of gentlemen dining in a sumptuous hotel parlor, which was lighted by electricity, and who could not keep warm. The room was high, and the air in the upper part of it kept descending slowly like a fall of snow, and acted like a damper upon their spirits and the tops of their heads. When the gas was lighted instead of the electricity, their spirits and the temperature simultaneously rose. But with the thermometer at 90° the case might have been reversed.

I am informed that in the Boston Post Office, where electricity has supplanted gas, that there is much complaint of its effect upon the eyes of the clerks. This may come to some extent from the smallness of the light-giving area as compared with gas, and its consequent much greater intensity; but I am also disposed to believe that it is not possible to maintain an absolutely steady light without an accumulator. This, as you all know, has long been sought for, and we have more than once heard glowing accounts of what had been discovered. That, in most cases, these discoveries have been greatly exaggerated is true; but I have reason to believe that a French one is in existence which will do its work if properly cared for and kept in order, though at a large expense. At any rate, the company which are proposing to light the Vienna Opera House are putting in one, in the efficacy of which they must have confidence, for it weighs 100 tons.

This does not sound much like the prospectuses which were so flaming a few years ago, when they talked of leaving boxes of electricity at your house every day, and taking off the old ones to recharge them; but it shows that if you are willing to pay your money you can have your choice of light. I believe that the time has come at last when the science of electric lighting has been so far mastered that it has become possible for a man to predict what he can supply electricity for and yield him a profit just as he can make a similar prediction about gas. I do not mean that this knowledge is widely disseminated; but I believe there are men who can do it. The more closely these men examine the question, however, the more are they convinced that, economically, it is no match for gas. It is a light of luxury, and, as such, has a demand; but, except under unusual circumstances, gas is much the cheaper if the electricity is surrounded by all those precautions

which are necessary to make it reliable, satisfactory, and safe; and it is well known to all of us that these are terms which do not apply to the electric light as ordinarily supplied at present. I do not, therefore, believe that it is destined to materially affect the gas business.

At the same time, it is a pity to see a large customer taken away from a gas company which is not, perhaps, too prosperous; and the question may well be considered, especially by the smaller companies, of the advisability of taking this business into their own hands, and supplying their customers not only with gas but with electricity too, if wanted. A gas company could make money when an electric company would fail. The office expenses of a small electric company are enough to swamp its profits, whereas the additional expense to a gas company would be a trifle. They already have the office, the clerk, the manager, and, perhaps, the boiler power; they have the engineers, and they have cheap fuel. They would only have to add an electrician to their staff to put themselves in a position to go into the business on the most favorable terms. It has come to my notice that more than one gas company is awake to the advantage of this step, and I earnestly commend it to the attention of the Association—especially of the officers of those sma'ler companies who most fear the inroads of electricity, and into whose towns it has not yet been introduced. Bear in mind most distinctly that in what I have said I have not said anything which can properly be construed into any fear of electricity. The encominm which I have delivered upon some of its virtues is more than counterbalanced by some of its ineradicable defects; but there are certain places where it is of use, and where people will put it in if they can get it, regardless of cost, and it is the supply of these places that I think a gas company might well undertake. That eminent member of our profession, Dr. Schilling, of Munich, has recently written an address on the subject, which has been translated and will soon be on sale in Boston; and, though I do not wholly agree with his conclusions, it will be found well worth the attention of this Association.

It has been alleged that one of the reasons for repealing the law of Massachusetts, which prohibits the sale of gas containing more than ten per cent. carbonic oxide, is that it prevents our making gas with which we can compete with electricity, because water gas, as it is called, is cheaper and better, etc. The Boston Company especially is taunted with its extra conservatism and old fogyism. It is true that we have opposed the manufacture of gas containing an unlimited quantity of poisonous gas, and we do so still. I am glad to find that our unwillingness to distribute it is a feeling which is still shared by the managers of many other companies. Let us look at the question for a moment, as now presented at our State House, and see whether the claims of its advocates are unanswerable. It used to be stated openly that all this talk about poisoning was moonshine, and that coal and water gas were equally deadly; but I think the report of the Health Officers of our State Board of Health has pretty thoroughly settled the fact that such a position is no longer tenable by a fair-minded man. It must be and is so granted by the principal witness for the petitioners in the case, and whose statement of facts is one which cannot be criticised for its entire fairness and truth.

The case as presented by him stands thus—that if coal and naphtha are taken at their average prices for the past five years, it is possible to furnish a gas, of 23 candle power, at 16 per cent. less cost in the holder than you can furnish a first-class coal gas. If the present prices of naphtha and coal are taken as a basis, then the difference dwindles to between 7 and 8 per cent. Mr. Granger estimates the cost of coal gas in Massachusetts, deducting residuals, at from 42 to 45 cents. This, of course, varies considerably, according to the value of residuals; but, assuming the larger figure as correct, we have a difference in favor of water gas of about 3½ cents per thousand, and a slight increase in candle power. Now, if this is the existing condition of affairs, does it justify the Legislature in repealing that protective clause for the want of which in other States so many unfortunate people have needlessly lost their lives? There have been read at this hearing a large number of letters from small towns and cities in various parts of the country, all speaking of the benefits and convenience of the gas. I do not doubt that in many places it is cheaper than coal gas; I do not doubt that some companies make more money by its use; I have no doubt that it is less trouble to manage a gasogen than a gang of laborers. I have no doubt that, in the smaller towns and cities, where gas is burned only by the more prosperous and intelligent members of the community, there is comparatively little danger of accident; but in a great city the case is different. Compare the experience of Baltimore and Boston during the past year—twelve deaths in Baltimore and one in Boston. It is all very well to say that if a man is so foolish, or so drunk, as to blow out the gas he deserves to die, and to comfort yourself with the thought that neither is probable in your case or that of your friends; but perhaps the people who are dependent for support on some of these unfortunates might think differently. It has appeared in testimony two years ago that the difference in favor of water gas in Baltimore was about two cents a thousand. Was the game worth the candle, there?

We took occasion this week to have a count made of the number of complaints made at our office during the past year of leaks of gas inside of buildings—not counting street lamps, but inside leaks only—and to our astonishment we found that it rose to over 2,800. Is there any doubt in the mind of any person present that out of that 2,800 we should have had some ghastly returns if we had been supplying a compound which consisted of from 25 to 30 per cent. carbonic oxide? It is not a case of smothering a little sooner or a little latter; it is a case of smothering or of getting off. Experiments made by Prof. Nichols last year, and continued this year by our own chemist, show that it is impossible to retain in any common room more than a small percentage of gas. I had a room prepared in our office at Commercial Point by putting weather strips on the windows and stopping up every hole that could be found; but twelve hours' running of 50 feet an hour into this room—which only held about 1,200 cubic feet—could not raise the percentage of gas to much over 6 per cent. at the height of a table. If one per cent. of CO will kill, it can be readily estimated how much sooner, in one case than in the other, that limit would be reached.

But, it may be said, are we to forego all the conveniences that come from using water gas as an enricher on account of an occasional accident from selling the unadulterated article. By no means. Nobody appreciates more than myself the present depression of the fuel market. The extreme cheapness of pea coal and culm has made it very difficult to sell all the coke that we make, and has left us with a surplus stock which must be sold at starvation prices. The case is not confined to us alone; there are other companies similarly situated. It would be a decided advantage to us to make some thousands of tons of coke a year into water gas. It would be the cheapest fuel we could use, and would remove from the market that surplus stock of coke which now spoils the price of the whole. I know no reason why we cannot do it, and still keep within the ten per cent. allowed by law. Again, it is convenient to have a large generator at hand—so I am told—which can make gas with small preparation and great rapidity on a dark afternoon, and that the cost of a new gasholder may perhaps be saved. Very well; suppose this is done, and that, as a consequence, the company is found with 12 per cent. or so on some dark day. Does this make trouble? Not at all. It is the continuous and persistent infraction of the law which is condemned. It is only after three times running over the limit that a fine can be applied. I do not mean to say what a company's legal position might be if it were shown that it was outside the law in case of accident; but I should not anticipate that much sooner with 12 per cent. than I did with 10 per cent. I see no reason why any company that sees fit to do so should hesitate to use up its residuals in this manner—making its surplus coke into gas and burning its coal tar—for any fear of the law as it now stands; but the man must be blind indeed who sees no difference between the supply of gas within the legal limit, or an occasional overstepping of a few per cent., and the liberty to supply a gas with three times that quantity of poison. If this policy were pursued by companies with a poor sale for residuals, it would not take a very large rise in their value to wipe out, in my judgment, a wider margin than is now claimed by the adherents of water gas. And let it not be forgotten that, with the prices that some companies get for coke and coal tar, there is already no margin to wipe out, and that the estimate of the cost of water gas is based, in my judgment, upon too low a consumption of naphtha; that, with a proper estimate, I doubt there being an appreciable margin, and that with any further rise in naphtha the margin might be the other way. So far as economy is concerned, I do not believe that there is any money at all in it for many companies at the present time. Their account for material would be increased, and their labor account proportionately diminished.

Of course, it is the business of gas companies to supply what the public demands; and if in the opinion of the Legislature it is desirable to remove the present restrictions, then we shall be at perfect liberty to take any means to provide the best and cheapest light; but I prefer that if it is done it shall be done against my protest rather than with my assistance or consent. One thing I trust will be insisted on if any change in the law is made—that each gas company making water gas shall be compelled to print upon its bills a statement of the percentage which carbonic oxide makes in its gas, and a warning against the danger of its escape. We are promised some figures on the subject here to-day, and I trust that we may have a discussion which will bring out every shade of opinion in the Association.

There is one other subject to which I invite your attention—that of Sunday labor. Early last summer at our North End works we began making lighter on Sundays, and finally, in August, we stopped the works altogether for 12 hours. This practice we have continued all winter. It costs the men half a day's pay a week, but they like it much better. It necessitates the carrying of 7 per cent. more retorts to make the same quantity of gas in a week; but this practice has its advantages as well as its objections. The only thing which I consider as a drawback is the effect on the retorts. That I am not yet prepared to estimate at its money value; but it undoubtedly produces some effect upon them to stand idle all day. Perhaps there are others here who have had longer experience than we have, and will give us the advantage of it. It is true that we have had a light winter, and that there were

times when we expected to be obliged to work on Sunday; but we escaped. A dark week might at any time render it necessary; but, as a general rule, there is no reason why for eight months of the year there cannot be a large cessation of Sunday labor, if it is a desirable thing. At any rate it is worth considering.

In conclusion, I will only call your attention to the fact that we have broken into our venerable custom of holding our annual meeting in Boston, and to urge you that this new departure may not be the forerunner of any lack of interest in the meeting. On the contrary, let us seek to give additional value to the occasion. We are to have several interes ing papers, which ought to provoke discussion—if men will speak their minds. There is a hidden sentiment among many of us that the truth is too precious a thing to be always told. That may be true sometimes; but I deny its application here. We cannot blink the facts about electricity, or about water gas, or about anything else; nor have we any reason to fear them. Truth is mighty and will eventually prevail; and if the New England Association wants, in the march of progress, to keep up with the band instead of straggling along with the baggage, it wants to be ready to discuss fully and freely every subject bearing upon the business of the companies which it represents. We never had so peaceful a time in Boston as we did when it was supposed that our business was in danger of being ruined by electricity; and I am not sure but that the general high prices of gas stock act as an incentive to those outsiders who are determined to get a piece of a business which has apparently neither competitors nor drawbacks. A greater familiarity with the facts might render the general public less envious of that prosperous ease which a gas company is popularly supposed to enjoy.

I am also constrained to announce the decease of one of our members, in the person of Mr. William J. Miller, of Bristol, R. I., whose death occurred last month. I had not the pleasure of a personal acquaintaince with him; but there are many of our number who had. I am sure that the Association will join with me in expressing our great regret over his death; and the Chair will receive any motion on the subject which may be offered.

When the reading was concluded, on motion a vote of thanks was tendered to President Greenough for the able and practical nature of his address.

Committee on Obituary Resolutions.

On motion, the Chair appointed Messrs. S. G. Stiness, of Pawtucket, A. B. Slater, of Providence, and W. A. Stedman, of Newport, as a committee to prepare suitable resolutions, expressive of the sentiment of the Association towards the late Mr. Miller. The motion also directed that the resolutions, when presented by the committee, and adopted by the Association, be inscribed on a page in the record book of the Association.

Reading of Correspondence.

Secretary Nettleton explained that invitations to attend the meeting were sent to many of the fraternity throughout the country. In response to these many replies had been received, and the Secretary thereupon read letters regretting the inability of the writers to be present at the sessions. Among those who wrote were Messrs. Wm. Coombs, of the Consolidated (New York city) Gas Company; Theobald Forstall, of the Chicago (Ills.) Gas Light and Coke Company; and W. N. Babcock (Secretary Central New York Association), of Syracuse Gas Light Company. Mr. Jno. P. Harbison added that he had received letters of similar purport from Mr. E. McMillin, of the Columbus (Ohio) Gas Light Company, and Mr. C. E. Hequembourg, of the Bradford (Pa.) Company. Mr. Stiness also remarked that he was in receipt of like notice from Col. J. H. Armington, of the Brooklyn (N. Y.) Company. Col. Armington was to start for Florida on Sunday, Feb. 14th, and regretted very much to be obliged to forego the pleasure attendant upon the 16th annual gathering.

President Greenough said that the Association's regret at the absence of these gentlemen was at least equal to their (the absentees') own. The members would have enjoyed exceedingly the presence of their friends; and all were sorry that the letter writers were not now in the Narragansett Hotel.

Report of Treasurer.

Secretary and Treasurer Nettleton here presented his annual report. In connection with the same he commented upon the excellent condition of the books and accounts as handed over to him by his predecessor in office, Mr. Geo. B. Neal. A summary of Treasurer Nettleton's report is appended:

Cash on hand, Feb., 1885	$77.83	
Receipts for year	415.00	
Total		$492.83
Expenses for year		341.08
Balance, cash on hand, Feb., 1886		$151.75

On motion, the report was received and placed on file.

Committee on Nomination of Officers.

On motion, Messss. F. C. Sherman, John Andrew, and C. F. Prichard were appointed as a committee to consider and report a list of names of the gentlemen whom it was proposed to select as officers of the Association for ensuing year.

In Regard to the Semi-Annual Meeting.

A motion made by Mr. Harbison to the effect that, "Hereafter, or until otherwise ordered by the Association, the holding of the semi-annual meeting be omitted; and that we confine our meetings to the regular annual February sessions," gave rise to an animated discussion. When the reasons for and against the adoption of the resolution had been thoroughly ventilated, Mr. Durfee moved an amendment which provided that the matter be left discretionary with the Board of Directors, as was the usual custom. Mr. Harbison accepted the amendment; and the Chairman said: "The motion now before the Association is that the matter of the semi-annual meeting be left for the President and Directors to settle." The motion was adopted.

Committee on Place to Hold Next Annual Meeting.

On motion of Mr. Harbison, the President appointed Messrs. L. P. Gerould, W. A. Stedman, and O. E. Cushing as a committee to consider and recommend the place wherein to hold the next annual meeting.

Calling Attention to the Question-Box.

The President here said that before taking up the reading of papers he would call attention to the fact that the Question-Box was in position, and it would be opened immediately after close of discussion on last regular paper. The Chair further stated that Secretary Nettleton had a list of the questions which had already been submitted. These would be distributed amongst the members in order that they might be ransacking their memories to discover what pertinent facts they could contribute to the discussion. He (the Chair) hoped the number of questions would be increased during the day; and expressed a wish that any member who had a "nut to be cracked," would put it into the box, in order that they all might have a "whack" at it.

List of Papers Read.

The following list embraces the papers that were presented and read:

"Fuel Gas," by Mr. C. F. Prichard; "Experience in the Manufacture of Water Gas," by Mr. J. H. Rollins; "Results in the Use of a Hydraulic Main," by Mr. S. G. Stiness; "Construction and Cost of a Holder Tank," by Col. W. A. Stedman; and "Notes on the Construction of a Gasholder Tank," by Mr. A. B. Slater.

Reading of Papers.

Chairman Greenough now announced that the reading of papers would next occupy the attention of the Association. He thereupon introduced Mr. C. F. Prichard, of Lynn, Mass., who read the following paper on

FUEL GAS.

There exists a widespread belief among the general public that, in the near future, a non-illuminating gas will be manufactured and distributed at such low rates that illuminating gas cannot compete with it. The gas maker is interested in this matter because it will create a larger demand for that special knowledge which this Association aims to promote. It is nonsense, therefore, to suppose he will oppose it from selfish motives; or that men, some of whom are rated high among scientists, cannot grasp the subject.

Of late the papers frequently contain allusions to the great success of natural gas, leading up to the possibility of a new kind of gas being manufactured which will take the place of coal for heat and power. These articles describe, in glowing terms, the convenience, the freedom from dust and ashes, and the many undoubted advantages which a gaseous fuel would have; but few even endeavor to show how the practical difficulties in the way can be overcome.

When figures are used they are somewhat in this form:

That, as is well known, one-horse power can be developed from 21 cubic feet of gas; and, as is also well known (to be stated) that fuel water gas can be manufactured for 5 cents per thousand, the obvious cost per H.P. per hour is about one tenth of a cent.

This, of course, is startling to those producing power at about one cent per H.P. per hour; and it impresses many with the idea that we are standing on the brink of a revolution in the matter of obtaining power.

The fact is not stated, however, that gases are not all alike in heat and power; 21 feet of nitrogen will not develop 1 H.P., nor will 21 cubic feet of carbonic acid; and because experiment has shown that 21 feet of that mixture which constitues coal gas of 18-candle power will produce one horse power, it does not follow that 21 feet of oil gas, water gas, producer gas, or natural gas will or will not produce one-horse power. Even writers of some note make estimates on cost of power based upon the comparative *cost of production* of two kinds of gas, not conceding the fact that one may have double or treble the calorific power of the other. While the cost of production of an article is liable to be somewhat removed from the selling price, there must be added the distributing expenses, the metering, the leakage, the office help, and many smaller items to fix the price at which it can be

sold to make a profit. The cost of coal at the mines, for instance, may be $1; but a precisely similar list of items increase its cost to $4 or $5 in this locality.

In addition to these, those with a taste that way are treated to technical articles, in which the results of experiments of the old scientists are brought out—mingled with chemical equivalents, thermal units, calorific power, and intensity—producing mathematical results of no possible value, from the fact that all these practical matters of efficiency, radiation, conduction, etc., are *entirely neglected.*

From these almost daily evidences we see that illuminating gas developing a new field of use for heat and power is threatened with a competitor in the somewhat vague form of a cheap gas.

Scientists prophesy the coming of a cheap gas. Electricians foretell of the use of the present mains to distribute cheap gas; and even gas engineers, viewing with despondency their increasing coke piles, suggest the possibility of turning it into fuel gas, and speak of laying an additional set of mains for distributing the cheaper gas.

Upon one point all seem to be agreed—that it is to be non-illuminating; because, as one or another puts it, the illuminants are expensive and unnecessary. Now, inasmuch as the 5 or 6 per cent. of illuminants in coal gas contribute to its total heat almost one-quarter, while the 12 or 15 per cent. of illuminants in water gas contribute to its total heat one-third, there seems to be good reason to question this point; and to even go so far as to question whether any gas will ever prove better or cheaper, heat for heat, than illuminating gas.

The principal gases proposed for a cheap gas are—1st, producer or generator gas; 2d, generator water gas; 3d, water gas proper. For the purposes of distribution the two former have not been much considered, for they are weak in power and carry too large a percentage of non-combustible gases for economic distribution. Generator gas, or Siemens gas, has been used to some extent without distribution, and with some success. Generator water gas—or Dowson gas, as it is known in England—has found still greater favor when generated and used with no attempt at distribution. Water gas, however, is superior to either; and, being practically wholly composed of combustible gases, can be distributed better on a commercial scale. It is lighter, and, carrying more heat per unit of volume, can be distributed more economically; and as there is but little probability of natural gas reaching these rock-bound States in sufficient quantities for fuel purposes, water gas seems to be the only one of the so-called cheap gases liable to become a competitor of illuminating gas.

The water gas spoken of is not the gas popularly called water gas—but true water gas, or the result of the action of incandescent carbon on steam. It is not that mixture labeled water gas upon which one professor exhausts his rhetoric and mathematics, for it does not contain 25 per cent. of nitrogen; neither is it that sample containing 8 or 10 per cent. of marsh gas upon which another professor figures; nor that freak of nature called producer gas, containing a large amount of hydrogen, upon which Professor "C." figures. Yet the above are actual cases. Learned men start with these figures, and after juggling with technical terms and schoolday formulæ, proceed to demonstrate the amount of coal required for each operation to a thousandth of a pound, or an amount which would not grim a stoker's hand, without considering in any way the efficiency of boiler, engine, or other apparatus.

As distributed in the city of Lynn, Mass., analysis by the State Gas Inspector shows it to consist as follows:

CH_4	1.65
H	50.29
CO	33.40
O	2.81
N	0.37
CO_2	9.48

This analysis agrees substantially with those made upon the Strong gas and others. Its specific gravity would be about 0.55, and it would carry about 256 units of heat. Coal gas would consist of about—

Illuminants	6.14
CH_4	38.75
H	45.37
CO	6.38
N	2.67
CO_2	0.69

Its gravity would be about 0.42, and it carries 626 units of heat. Placing the two side by side—

Kind.	Spec. Grav.	Combustibles.	Total Heat.
Coal gas	0.42	0.97	626
Water gas	0.55	0.88	256

we notice that coal gas is purer, lighter and stronger. Being purer, it carries more heat per unit of volume, as the impurities—nitrogen, oxygen and carbonic acid—are not heat givers. Being purer in these compounds which are injurious, it complies better with those laws which govern health. For although it is proposed to ventilate by the chimneys, many open flames are necessary for small burners; and, in actual practice, there is a decided odor when foul gases are burned, caused probably by down drafts or distributing currents.

Being lighter, the expense for distributing plant is smaller; or, more gas can be distributed at less pressure. While being stronger, the same result follows, since more than twice the heat can be distributed by carrying the same amount of gas.

It then follows that, all the advantages of distribution being with coal gas, the question becomes reduced to one of cost in the holder only. For it is not probable any one here will be misled by the argument that more fuel gas would be distributed than coal gas. Possibly it would if one were used for heating and the other for lighting; but we are here considering which would be the most suitable for heat and power—and the cost is the only argument ever brought against coal gas as means of heat and power.

That the theoretical proportion of 626 to 256 is practically true, there is no reason to doubt. Among other records of actual trial can be found that of Mr. Eugene Vanderpool, late President of the American Gas Light Association, also, others made upon the Strong gas, at Mount Vernon, New York. The chemical composition was about as given, and the heat developed from coal gas was two and one-third times as much as from water gas.

The gas engine being an instrument for converting heat into power, and the amount of heat developed by one being more than twice as much as by the other, we have every reason to believe that the amount of power would be in that proportion. No experiment or tests having been made, through the kindness of the owners of an engine in Lynn, I was enabled to make some actual working tests.

The engine was a seven-horse power Otto engine, and is probably the only one in existence doing daily work, so arranged that it can be instantly changed from one kind of gas to the other. For the purpose of the test a new meter of sufficient size was connected with the engine, and so arranged that either gas could be passed through as desired. The meter and engine being the same in each case, and the work to be done being the everyday work of a machine shop, it is thought that the test is a good comparative practical one. To further make certain that no error of arrangement should be made, and that the results should be accurately interpreted, a competent scientific engineer made all arrangements, and indicated the engine. The following results were obtained:

Indicated horse-power	3	
Revolutions per minute	158	
Possible number of explosions	79	
	Coal Gas.	Water Gas.
Actual number of explosions	58	69
Cu. ft. consumed per horse power per hour.	40	79

The engine had been adapted to fuel water gas, by putting in a valve with larger ports, and increasing the compression in the cylinder. Therefore, these results favor fuel gas, and leave no doubt but that two and one-third to one is also the proportion of power developed.

In making these figures it is not claimed that the engine was doing its best possible work, and consequently, it is not claimed that it will take 79 feet of water gas to develop one horse-power, but it is claimed that it is a perfect comparative test, with one exception, the engine itself—which favored water gas fuel. All other elements in the calculations were in error to the same extent in each case. Had it been possible to adapt the engine in turn to each gas, the result would have been still more in favor of coal gas.

Therefore, with the results of experiments for heating and power both before us, we may accept as fact that illuminating gas can compete with water gas, even though costing two and one-third times as much. And considering that all the advantages of distribution are in favor of illuminating gas, combined with the developed business of lighting at which fuel gas has done nothing as yet, it can be safely said that those companies putting gas in the holder at 35 cents or less, are even now prepared to compete for what business is in the field.

The demand for fuel gas among actual consumers, however, appears to be extremely small. It is true that any fuel has its demand and uses —even the expensive one of alcohol—but all requirements at present existing are well filled by coal gas, sold at reasonable rates.

Theoretical figures could be made showing you that coal at $5 per ton is eight times as cheap as fuel gas at 50 cents per thousand; and although this difference in cost is large, practical experience brings up many circumstances which modify theory and make the case still worse.

No more practical test has been made than that of Mr. A. C. Wood, (the President-elect of the American Gas Light Association,) and Mr. D. M. Dunning, of Auburn, N. Y. These gentlemen, independently, for an entire winter, heated their houses by gas. Their extensive experiments agreed in showing coal gas to be worth six cents per thousand, as against coal; or water gas would have been worth about three cents.

Dr. Letheby made experiments, and calls coal gas worth 20 cents, or fuel gas would be worth about 9 cents. The discrepancy is probably due to the fact that one was a practical test, and the other conducted in a laboratory with extreme nicety. Again, experiments made at Elgin, Ills., in firing boilers, show fuel gas to be worth about five cents per thousand.

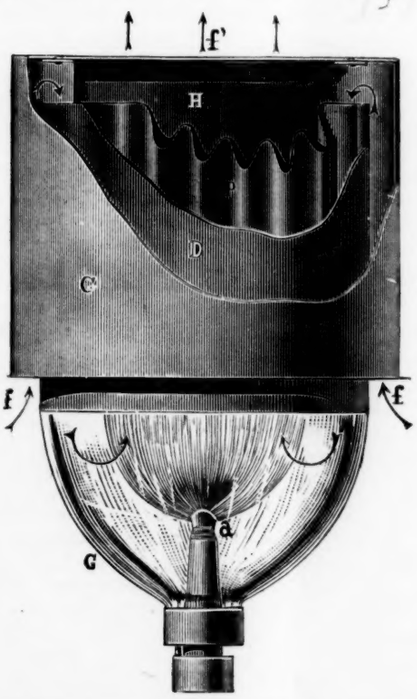
Natural gas (which exceeds coal gas in heating power about 33 per cent.), as compared with coal at $1 per ton is worth six cents per thousand. It, however, readily sells for about double this amount, on account of its cleanliness and convenience. With coal at $5 per ton, natural gas is worth 30 cents per thousand, with perhaps 10 cents added for convenience account. Fuel gas on this basis would be worth in this vicinity 10 cents, with whatever added for convenience thrifty New Englanders would be willing to pay.

[To be continued.]

The Delmas Lamp.

A recent issue of the *Journal des Usines a Gaz*, in reverting to the subject of the invention of M. Delmas, explains that the Delmas "hot air" burner is by no means a novelty to French gas engineers. Two years ago it was exhibited at the annual Congress of the French Association of Gas Managers; and its principal features, as then displayed, have not been greatly modified since. The following cut and description will give the reader a good idea as to its mechanism and operation.

The apparatus consists of an ordinary slit steatite burner, enclosed in an oval globe, *G*, so that the air does not reach the flame from underneath.



The globe and flame are of equal height, and the former supports the reheating apparatus, which consists of an oblate central chimney, conforming to the general shape of the flame. This chimney is surrounded by a corrugated material, *P*, intended to increase the area of heating surfaces, and extends to within 15 millimeters (0.59 inch) of top of chimney. The corrugated substance is itself enclosed in an envelope, *D*, which surrounds it to the very top, and also extends below the chimney; that arrangement forming a close joint with the globe for the purpose of preventing any return of the air.

To avoid loss of heat by radiation, and to still more greatly increase the heating of the air, the entire upper portion of the apparatus is enclosed within a third tube, or envelope, *C*, so arranged as to leave a uniform open space of 10 millimeters (0.39 inch) around the globe; and, at the same time, be calculated to support a reflector of opal, tin, or any other suitable material.

Under these conditions the requisite quantity of air necessary for the proper combustion of the gas issuing from burner in the globe must ascend through the space comprised between the chambers *C* and *D*, to the top of the chimney, from whence it redescends along the corrugated substance, *P*, receiving from the metallic walls of the latter all the heat due to the products of combustion escaping by the central chimney.

M. Delmas has bestowed much time and thought towards properly determining the most favorable conditions under which to utilize the gas. He thinks that the present arrangements, regarding dimensions of air passages and disposition of the products of combustion, guarantee the best conditions for consumption, and insure a flame of remarkable steadiness. In order to add to the illuminating effectiveness of the lamp, the inventor thought that possibly a glass lining might be located upon one of the walls of the corrugated material, the intention being to cause that lining to act as a reflector; but, at least so far, the experiments made in such direction have not yielded results sufficiently satisfactory to warrant the conclusion that that part of the problem is solved.

Two styles or capacities of the Delmas burner are now on the market. No. 1, consuming 90 liters (3.18 cubic feet) of gas, gives a light equal to 1.30 carcels (carcel = say, 9.6 candles), when employing a plain globe, and 3.60 carcels when using a globe with reflecting lining. The No. 2 specimen consuming 140 liters (4.94 cu. ft.) affords 2.25 carcels with a plain globe, and 5.40 carcels with lined globe. The *Journal* explains that it is difficult to account for such a great increase in illuminating power, looked at in the light of reasoning pure and simple, and then adds, "be that as it may, however, there is a very marked increase in the light giving power," to which our authority naively adds, "especially when the lining is new."

Our French contemporary further explains that the information given is communicated by M. Delmas, and applies or relates to Paris gas. If a richer gas is used the quantities will be reduced to about 85 liters (3 cu. ft.) for No. 1, and to 135 liters (4.76 cu. ft.) for No. 2. The burner requires a regulator.

Placed in lamps entirely open underneath, it is claimed that the Delmas burners work well; but in these it is necessary that overhead air conditions must be carefully watched—a practice not always possible in public lighting. Notwithstanding the high temperature to which the globes are necessarily subjected, they last for an almost indefinite period. Caution, however, must be exercised when cleaning them.

In conclusion, our contemporary notes that the Delmas system recommends itself greatly on the score of simplicity. It is easily substituted for the ordinary burner, and the adaptation causes no trouble. Besides, apart from mere facility of substitution, it guarantees an advance in the important respect of securing increased illumination over equal quantities of gas supplied.

"Chartered Poison Sellers."

Thus succinctly and truthfully does the London *Journal* introduce the following editorial remarks:

"The revelations as to the deadly character of water gas are accumulating across the Atlantic; and in other parts of the world they would create a panic. Citizens of the United States, however, are astonishingly tolerant of injury to life and property committed 'in the way of business.' But for this spirit of forbearance, the sale of illuminating gas containing a high proportion of carbonic oxide would never have been permitted. Of late years a publication has been started in defence of the water gas interest; the writers being paid to abuse coal gas and its adherents, and to deny the existence of any danger connected with the use of water gas. It is difficult to see, however, how the least scrupulous advocacy can dispute such evidence as that dealt with by our American correspondent in the series of articles now in course of publication in our columns. The data drawn by Dr. Abbott from the example of New York, Baltimore, and Brooklyn are most striking. When deaths from gas poisoning increase twelvefold, it is natural that people should inquire into the origin of such an expansion in the rate of mortality; and when the increase is coincident with a change in the gas supply, it is equally natural to conclude that the explanation has been found. If the water gas dealers have any other interpretation of Dr. Abbott's returns to offer, it is time they took their defence seriously in hand. Statements of this character, moreover, bring the question of personal and joint-stock responsibility into strong relief. It is probable that among the water gas shareholders and managers in New York, Baltimore, and Brooklyn there are many highly respectable people who 'profess and call themselves Christians.' We wonder if it has ever occurred to these persons that but for them, individually as well as collectively, a number of their fellows now dead would, according to the doctrine of averages, be alive and well? The question arises how the responsibility for this wholesale homicide by joint-stock companies is to be apportioned. We all know that boards of directors have neither bodies to be kicked nor souls to be condemned; but people do not get out of personal responsibility by putting the care of their consciences in the hands of a board. Mr. James Russell Lowell would not find any difficulty in 'putting the saddle on the right horse.' It is marvelous that men should be permitted by the laws of their country to distribute this insidious poison, without hindrance and without question, in all the States of the Union, with the solitary exception of Massachusetts.

"One word may be permitted with reference to the recorded cases of gas poisoning in England. Out of the large population of England and Wales, notwithstanding the high proportion of gas consumption per head, only 24

deaths from inhalation of gas are recorded for the five years ending with 1883, and of these only 17 are definitely ascribed to coal gas. The great majority even of these were men; and if the circumstances could be ascertained it would be found that very few were strictly comparable to the gas poisonings in the States, for the latter are chiefly cases of deaths in sleeping-rooms in which gas has escaped unlit, by accident or design, while the English cases are, in general, casualties to workmen engaged in avocations that have exposed them to gas accumulations in confined places."

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, Feb. 10, 1885.

The Quality of Glasgow Gas—Twenty-eight Candle Gas is not Very Elastic—Mr. George E. Davis on Enriching Gas and Utilizing Tar—Sugar from Tar—Anno Domini—The Accounts of the Gas Light and Coke Company.

For some years past the Corporation of Glasgow, who are the owners of the gas works, have been exercised in their minds about the quality of the gas they supply. And this not in the usual acceptation of such an expression, that the illuminating power of the gas does not give satisfaction. There is no complaint from the consumers. But these astute Scotch burghers consider that the gas is too good. They have been in the habit of supplying a 26-candle article, and now they think it would be better for all parties concerned (and for themselves in particular) if the standard was reduced to 21 candles. As is only to be expected, a large section of the gas consuming public do not agree with their legally elected representatives in this matter. As long ago as 1882 the sanction of Parliament was obtained for making this reduction in quality; but the force of public opinion in Glasgow has hitherto been sufficient to prevent it from being carried out.

Although at first sight this proposition looks like an instance of that faculty for sharp dealing with which Scotchmen are proverbially credited, there is much reason behind it. For it is a matter of general remark, respecting the gas of 25 to 30-candle power which is supplied in many parts of Scotland, that the consumers actually realize but little if any more value from it than is obtained from gas of only two-thirds of the nominal value in England. The reason of this is that the 28-candle gas from cannel coal requires to be used with considerable care in order to develop its full powers. It is very apt to smoke at low pressure, and in practice it must be consumed at a higher pressure than 20-candle gas in order to maintain the flame steady and smokeless. The effects of pressure as regards illuminating power are well understood. Further, it is not very elastic. An important feature of ordinary 20-candle gas is that it can be turned "up" or "down" or used to any one of a considerable number of burners representing varying rates of consumption, say, from 2 up to 6 or 7 cubic feet per hour, with but little prejudicial effect as regards the "duty" obtained from it. But to obtain the nominal value from 28-candle gas it must be burned at the nominal rate of 5 cubic feet per hour. If reduced to 3 cubic feet or less, it gives less duty than the 20-candle gas. Dr. Wallace and Mr. Foulis have recently tried some experiments on this point with the following remarkable results:

Nominal Quality.	Consumption per hour.	Illuminating power.
26-candle.	5 cubic feet.	26.16
23 "	5 "	24.17
20 "	5 "	22.62
26 "	3 "	11.96
23 "	3 "	12.94
20 "	3 "	12.26

The burners used were ordinary fishtail of the size best suited to the rate of consumption, as likely to be provided by an intelligent gasfitter, and the above extracts represent well the quality peculiar to rich gas, which I have called want of elasticity. It will be observed that the 26-candle gas, consumed at the rate of 3 cubic feet per hour, gives less light than the 20-candle.

The reasons hitherto advanced in favor of the proposed change are (1) A more than proportionate reduction in first cost, leading to cheaper gas. (2) Not so much liability to smoke and more elasticity. (3) Less liability to be affected by temperature, as the high power gas is apt to deposit hydrocarbons in cold weather, choking the pipes and producing loss of illuminating value. (4) Greater suitability for purposes other than lighting. The opponents of the scheme urge that the gas will be reduced in value for heating purposes, and that a larger quantity of gas will have to be used for similar purposes, necessitating alteration and enlargement of existing connecting pipes, and that for the same illuminating value a greater quantity of air will be vitiated. So far, especially when the increasing value of the rich cannel coals that are necessary for the production of gas of 25 or more candle power is taken into consideration, it appears that the corporation have the best of the argument.

Mr. George E. Davis, the Honorary Secretary of the sulphate of ammonia producers association, has lately read an interesting paper on "the enrichment of coal gas by certain hydrocarbons," before the London section of the Society of Chemical Industry. Referring to the numerous attempts that have been made in the way of gasifying tar, none of which have proved successful, he ascribes the cause of the failure to the fact that the pitch and heavier constituents were not first removed. He also points out that the failures in carburetting gas are largely due to a fact which has not hitherto been appreciated, viz., that in passing through the carburetting fluid the gas not only takes up light hydrocarbons but deposits others. There is a kind of exchange taking place, and so, if the gas already contains valuable light-giving constituents, it is possible that the result of the change may not be very beneficial to the gas. None of the commercial hydrocarbon mixtures generally used can compete in point of price with cannel coal as an enricher of gas; but he incidentally mentions that creosote oil, at 2d. per gallon, is being successfully and economically applied for this purpose. But I must pass over Mr. Davis' interesting remarks on carburation to come to what, in the eyes of the gas engineer, is the gist of his paper. This is a scheme for dealing with tar on the gas works, leaving only pitch, anthracene and naphthaline for sale—the remainder being used for enriching the gas. The separation is carried on by fractional distillation in the usual manner, and the lighter oils are distilled a second time, when their vapors are conveyed directly to an ordinary "through" retort, as used for gas making, and they are allowed to pass into the hydraulic and mix with the ordinary coal gas. Mr. Davis estimates that they will thus yield 80 cubic feet of 50-candle gas per gallon of oil. By the application of this system it would be possible either to largely increase the illuminating value of ordinary gas without diminishing the yield per ton of coal. Or the quantity can be increased, at the same time maintaining the quality of gas that has hitherto been supplied. There must be a limit in the latter respect, as, where the heats are raised to increase the yield of gas, the quantity of light oils in the tar is also diminished; so that it might be possible to reach a point where the tar failed to be good enough to furnish sufficient enriching material. The idea of returning the lighter portions of the tar to the gas is already carried out to a considerable extent by the use of hot condensers, washers, analysers, and other appliances in which the gas is brought intimately into contact with the tar while still hot; and if Mr. Davis, after practical working, finds it possible to convert all the tar into gas, with the exception above named, then the question will arise, whether the same thing cannot be effected by simpler and more direct means. A set of three stills, with the necessary condensers, pitch bays, etc., as recommended by Mr. Davis, is no inconsiderable addition to a gas works plant; and seeing that these are intended for the separation of products that were once contained in the gas, it would be cheaper and more direct to so manage matters as to leave them there in the first place.

An interesting paper was read before the Manchester section of the same society on Tuesday last, by Mr. Ivan Levinstein, giving an account of a new flavoring substance produced from toluene, a hydrocarbon present in coal tar, which he said had hitherto been known only as a chemical curiosity, but was now likely to enter the market as a commercial product. The chemical name of this promising substance is benzoic anhydro ortho sulphanine, and as this, however suitable for scientific, is scarcely fitted for ordinary purposes, the more seductive and readily pronounceable term of "Saccharin" has been bestowed upon it. This popular name indicates the distinguishing property of this substance, which is that of intense sweetness. At present it is rather costly, £20 a pound, but its alleged quality is proportionate, for it is said to be 230 times as sweet as the best cane sugar; and that one part of it confers a very sweet taste upon 10,000 parts of water. It is of no nutritive value, but on the other hand, appears to be quite inert as regards any effect on the human system. It is not very soluble in cold water, but readily disolves in alcohol and other solvents, so at any rate, it will be useful for conferring upon inferior sugar a flavor equal to that of the best lump. Mr. Levinstein said that at present a lot of dirty sugar was used for making cheap preserves, and that these could be made of 99½ per cent. of fruit, and one-half per cent. of saccharin. I am not in the secrets of the cheap preserve trade, but according to popular report, the word "vegetable" should be substituted for "fruit." But it is evident that a substance possessing these properties is likely to prove of great commercial value, although it is questionable whether the quantity obtainable from coal tar would be sufficient to cause any important increase in the price obtainable for that article. Toluene is a member of the benzine series, and unfortunately happens to be a valuable constitutent of coal gas. If Mr. Fahlberg can find out how to make "saccharin" out of pitch or creosote he will indeed earn the gratitude of the engineers. Some time since a paragraph went the rounds of the scientific press, to the effect that artificial quinine, fully equal in therapeutic properties to the natural product, could be prepared from coal tar at the price of four shillings per pound; but I believe that peruvian bark still remains the only source of quinine. Mr. Levinstein has advanced further than this, as his audience had an opportunity of regaling themselves with lollipops made with saccharin.

A new way of getting rid of officials who are judged by reason of advanced years to be incapable of properly discharging their duties—a task at all times awkward and unpleasant to any one who, notwithstanding the money-grubbing spirit of the times, does not allow the demon of business to override all natural human feelings—has been suggested by a shareholder in a foreign gas company. On a venerable director being proposed for re-election, this considerate member objected on the ground "that the candidate was suffering from the disease—*Anno Domini;*" but the speaker spoiled the effect of this elegant and euphonious expression by adding the blunt assertion, "that he was getting past work." Perhaps, as an afterthought, he remembered that some of his audience might not understand Latin. It is said of a certain Lord Chief Justice, that when a friend invited him to retire from office, for a similar reason, he promptly arose, and challenging his interviewer to a boxing match, fairly boxed him out of the room. This sufferer from *Anno Domini*, however, simply ejaculated, "nonsense!" an opinion in which the majority of shareholders appeared to share, as he was re-elected.

The directors of the Gas Light and Coke Company, of London, have just issued their half-yearly report for the second six months of 1885. They complain of a "serious decline in the value of residuals," and with good reason, as their receipts for residuals are only about £282,500, which, as compared with £344,000, the corresponding item for the same period in the previous year, shows a falling off of some £61,500, or nearly 20 per cent. Otherwise things are satisfactory. The receipts for gas have increased at about the usual rate of 4 per cent. The directors are keeping a tight rein upon the capital account, which is reduced, by amounts written off for depreciation, etc., to the extent of £36,000; and as the expenditure for new plant during the six months is only some £15,000, the result is a net reduction of more than £20,000, bringing the actual expended capital under ten and a quarter millions sterling. The actual profit earned during the half year is £437,600, about £70,000 less than that earned during the corresponding period of 1884, and this diminution is accounted for by the cause above noticed. The item of "Rates and Taxes" has also been increased from £60,000 (in 1884) to £64,300, in 1885, or to the extent of about 7 per cent.; and there is also a pretty good lawyer's bill, the "law charges" amounting to more than £4,000. The other items of expenditure remain about the same as last year.

Mr. C. H. Nettleton on the Rostrum.

Mr. C. H. Nettleton, of Birmingham, Conn., is well enough known to our readers to render any formal introduction of him to them here entirely unnecessary. The "great American public" like to be talked at, and the gas consuming portion of them display an indubitable fondness for growling at the gas purveyor; "and so it comes to pass" that occasionally a shrewd gas man takes advantage of the situation to talk at the growlers, in the attempt to lead them on to a better understanding of the poor basis which they have for their growling. Mr. N. essayed that task with the residents of Birmingham on the evening of the 12th ult., and we think that his effort was attended with success. Certain it is that his auditors showed their appreciation of the lecture by awarding the speaker close attention throughout. Mr. Nettleton and his auditors were comfortably housed in the spacious parlors of the residence of Mr. D. M. Bassett, on Seymour avenue; and although the night was signally stormy, a goodly throng had assembled to greet the lecturer. The following is a summary of Mr. Nettleton's remarks:

He commenced, in an apologetic vein, by referring to a supposed contrast that would, he thought, inevitably be drawn between his talk upon so dry a subject as gas and the theme so ably handled by Mr. Gager on a previous occasion—viz., the famous battle of Gettysburgh. Nevertheless, having suffered himself to get enlisted in the cause, he had gone at the work with the determination that if he failed to instruct it should "not be for the want of good intentions; but," said Mr. N., "you all know where such paving stones are used." Without further preface, therefore, the lecturer proceeded to "try to explain" to his audience something in regard to the manufacture of gas, and to throw some light upon

"Ways that are dark
And tricks that are vain,"

which gas companies are supposed to follow and practice.

Within 75 years, from very small beginnings, there had grown up an enormous industry. In this country alone there are quite 1,000 gas companies, with not less than $300,000,000 invested, and in the world not less than $1,000,000,000. Each year the business gains in volume, but as the prices have been reduced the profits are not so large as they formerly were. At the present time the best that can be said of gas stocks is that they are safe and reliable. It is from this steady growth that the owners and managers of gas companies take heart. They think that a business which has been steadily growing for 75 years, and has attained such enormous proportions, cannot be wiped out by any ordinary invention or discovery. And most of them believe that the time has not come, nor have the means been discovered, that will check its growth.

Mr. Nettleton then, by means of a quite extensive variety of apparatus, together with a series of charts drawn for the occasion, proceeded to tell out of what material common illuminating gas is made, and to illustrate the same by making a clay pipeful on the spot, by the help of his assistant, H. Stacey Whipple. The speaker then showed how, by the introduction of various new expedients, the cost of gas had been reduced—principally through the introduction of furnaces, whereby a very much larger amount of coke was saved than formerly.

The subject of impurities was then taken up, in the course of which it was shown how impossible it was that air could be introduced purposely into the gas, as many suppose, and make the fraud profitable. The method of removing ammonia, sulphur, etc., was illustrated, as well as the production of tar and other residual elements. Of tar the lecturer said: "This is a most wonderful article. It is composed almost exclusively of compounds of carbon and hydrogen, and from it have come many things that give comfort and pleasure to our lives. From it is extracted benzole—the source of the aniline colors; anthracene; alizarine, which takes the place of madder; naphthaline, yielding permanent colors—nearly all the coloring matters now used in cloths of all kinds comes from coal tar; creosote oil, from which is made a lampblack used exclusively in the manufacture of printer's ink; cresoline, which is the active agent in giving relief in whooping cough and kindred diseases; creosote, for the preservation of wood. Tar also yields an aromatic series of compounds, such as oil of bitter almonds, oil of peppermint, myrbane, and from these, to some extent, candies are flavored." The smoky flavor is also given to "real genuine old Scotch whiskeys"—made in Kentucky. It also yields carbolic acid, salicylic acid, and hosts of less familiar compounds. It has even yielded an artificial quinine, though in its after-effects not so satisfactory as the genuine. The gas works are now the sole source of ammonia, which is so extensively used as the active agent in fertilizers, etc., and for the ice machines by which the hot climates are now almost entirely supplied with artificially-made ice. It is the utilization of these residuals that enables the companies to sell gas so cheaply.

If the case ever comes in this country, as in the case of some foreign companies, where the residuals pay the entire cost of manufacture, then gas will be sold here as it is sold abroad, at $1 per thousand feet or less.

With regard to the gas meter Mr. Nettleton spoke as follows: "This innocent looking little machine is supposed to have in it all the elements of perpetual motion; and if Keely with his motor had given out that he had adopted the principles used in a gas meter, I am inclined to think that many would have believed implicitly that he had the elements of success. It is supposed to move whether a house is shut up for the summer, or is closed for a year while the family are away in Europe. Of course I have faith in the meter myself, otherwise I should not be in the gas business; but I confess that my faith was tried when my December gas bill was handed me this winter. It did not seem possible that I could have burned so much gas; and probably if someone else had the management of the gas company he would have heard from me in somewhat forcible language. I have a great deal of sympathy for men who find fault with their gas bills. Compared with what they have received, some bills seem enormous; and more than once—yes, more than a hundred times—I have dreaded to present bills because they were so large in proportion to the amount of gas I believed the consumers to be using. Now, what is the cause of this suspicion, or belief, if you will, that meters are wrong? I think it is due to the fact that the gas has to be measured in a closed vessel, and persons cannot see its workings. If gas could only be sold like so many yards of cloth or pounds of sugar, all trouble would cease. Then each person using gas would know exactly what he was receiving; but here is a black tin box which goes on and on, apparently like Tennyson's brook, forever, grinding out bills so large that they become veritable surprise parties.

"Again, when a bill is presented the facts are not always known to the person who so strongly objects. As an instance—a bill was presented to a storekeeper in this town recently; he thought the bill large, and became angry; he made a statement that he burned so many hours each night, and at no other time. On his statement of facts the bill was altogether too large; but within two days his burners were seen lighted in the morning and on evenings, when he said they were not used. And yet the man is honest; he is one of the best men we have, and I would as soon question my own statements as his. He was simply mistaken.

"In another case a man had been absent for several months, in Europe, I believe. He had taken the precaution to have the statement of his meter taken the last thing before going away, and on coming back, before the family had gotten into the house, he had the statement taken again. There was quite a large difference, and he immediately complained, in language not particularly mild, to the manager of the company, who happens to be a personal friend of mine. The latter went to the house at once with the gentleman. They found the statement to be taken correctly; but my friend no-

ticed the meter moving, and on going through the house a lighted gas burner was found which had undoubtedly been going since the house was closed several months previous."

Mr. Nettleton said that a large amount of gas was wasted by using poor burners. If those who use gas would change their burners more frequently they would either obtain very much more gas for the same amount of money, or else they would save quite a proportion of their gas bills.

In conclusion Mr. Nettleton said that in his talk he had sought to give the impression that the gas business is conducted on the same honest principles that are the foundation and strength of every legitimate business. One of the ambitions of his life is to have the Derby Gas Company pay 10 per cent. dividends, and at the same time to do it while selling gas at $1 per thousand feet. He might not live long enough to accomplish it, but his successor would.

After the lecture the company was invited to partake of a fine entertainment, provided by Mrs. Bassett for the occasion.

Economy Test at the Harrisburg (Pa.) Station, Edison System.

The following embraces statements culled from the original report issued from the Edison Company's office in New York city, in regard to the working of the Harrisburg Edison electric plant. Of course, it must be understood that this is a "show test."

This central station of the Harrisburg Electric Light Company is what is called an overhead wire station. The boilers were in battery, set with the Jarvis patent furnace. The report was submitted by Mr. Wm. J. Hammer, chief inspector.

In conjunction with the investigation of the Harrisburg central station, an important economy test was carried out (Aug. 29th and 30th) covering a 12-hour run, from 6 P.M. to 6 A.M., to determine the efficiency and reliability of the various station units as well as the economy of working of a typical Edison central station working under the normal condition of load, etc. Twelve persons took part in the test, and through a systematizing of the arrangements of the tests beforehand, the tests of boilers, engines, dynamos, testing instruments, readings, indicator cards, etc., were taken upon the stroke of a gong at stated periods; all time-pieces being set to one standard. The apparatus used was of a standard pattern compared with accurate standards. The measurements and weight of water and fuel were taken by Mr. Hammond, of the Jarvis Engineering Company, and Mr. Beggs, treasurer and general manager of the Harrisburg Electric Light Company. The scales employed were tested with U. S. standard weights, and the water measured in a standard tank; the water being run into same to a given level and weighed by the above standards. The temperatures of water in tank and feed water were taken with standard thermometers reading to 10ths of a degree, and checked by standard thermometer having a "Yale" certificate. The temperatures of gases in the stacks were taken by a pyrometer supplied by the Jarvis Engineering Co. The stacks being of iron, and two boilers working into each stack, an opening was made into each and the temperatures were taken alternately. During the running of the three boilers (one boiler not being used in the test) the difference in the temperatures in the two stacks was inconsiderable. The draft in the two stacks was taken by means of the apparatus devised by Prof. Burkett Webb, of Cornell University, the same having been endorsed by the Franklin Institute test committee, of Philadelphia. During the test no water was thrown under the grate, and the fuel contained only the moisture which it contained when delivered—*i. e.*, 1.77 per cent., which was allowed for in the calculations. The mixture used during the test was three parts of anthracite screenings to one of soft coal (Clearfield bituminous). The value of this mixture being $1.2275 per ton of 2,000 pounds delivered in station.

Prior to the test an examination was made of the boilers, and they were blown off and cleared thoroughly; they were then brought up to their normal working pressure, and, at the time of the start, the fires were quickly drawn, the furnace and ashpits cleaned, and new fires started with 600 pounds of wood. The coal used in starting the fires was a trifle richer than three parts screenings to one of soft coal, but later this was allowed for, so as to maintain these proportions throughout. A strip of black court-plaster was pasted at the height of the water in the gauge glass, and the water held at the same height at the end of the run. The conditions at the start were maintained the same, so far as concerned the boiler pressure, height of water, etc. No fuel remained on the grates at the end of the test, the last serving being worked very close.

The temperatures of the feed water were taken from water drawn into a pail from the feed-in pipe midway between the heater and boiler; the first pailful in each case being poured away to prevent loss by cooling in the pail. Tests were also made at the heater, and at the points of feeding into the boilers. The water was supplied to the standard measuring tank from the city mains, and drawn into a reservoir beneath, and pumped thence through the feed water heater by a "New Era" pump, which was backed up by a Korting injector. Cards taken from the pump showed an average of 1 h. p. ind. Immediately after the test the fires were drawn, and all ashes and refuse weighed on the fuel scales.

The steam pressure was taken from a standard gauge which had been tested previously at the Pennsylvania railroad car shops. The individual gauges which read closely were not considered.

The showing, so far as the boilers were concerned, was admirable, and speaks well for the Jarvis patent boiler setting with which they were set. The boilers (of which the station has four) are of the single return tubular type. Their principal dimensions are as follows:

Diameter of shell	72 in.
Length of shell	15 ft.
Number of tubes	120
Diameter of tubes	3 in.
Length of tubes	15 ft.
Width of furnace	75 in.
Length of furnace	72 in.

Grate bars; ten full bars 6'x6'. Deep side bars with arc cross-sections 5-16 inch thick.

Width of air spaces, ⅜ inches.

Air space is 50 per cent. of grate surface.

Height of chimney	70 ft.
Diameter of drain at base	46 in.
Diameter of drain at top	52 in.
Area of chimney	1,661 sq. in.

(Two boilers connected to one stack.)

Draught area through tubes, 729.96 sq. in. to each boiler.

Area of smoke box	729.61 sq. in.
Area of grate surface	37.43 sq. in.
Total heating surface	1,626 sq. ft.
Steam space	99.14 cu. ft.
Water space	236.66 cu. ft.

Mean water line....6½ inches above top row of tubes.

The electrical tests were carried out as follows: Two standard E. M. F. indicator testing boxes, which had previously been compared, were connected at the ends of the omnibus wires in the station, and indications were frequently taken to determine the variation on both sides of the three-wire system. Upon the next floor, in the rear, a room was fitted up for taking readings from time to time, by means of a Thomson reflecting galvanometer, which was used to check off the readings of the main, neutral and individual (shunt) ampèremeters in the dynamo room down stairs; which readings were taken at the stroke of the gong. The various machines used in the test were of the No. 20 type, 400 ampères, were tested individually and in pairs, and by means of a large switch they were connected through a German-silver shunt, having a capacity of 1,200 ampères.

Prior to the test, tests were made of the dynamos as to insulation, faults, etc., and they were found in perfect order. Tests of their speed were taken throughout the tests, which showed but a slight variation.

In the general characteristics the Harrisburg station may be considered the standard Edison central station. It has been constructed both with an eye to efficiency, reliability, and permanency. Though constructed by the local parties, the company has not spared trouble or expense in putting in a station alike creditable to themselves and to the present management of the New York company, which has broadened out its field of work by a more liberal treatment of the vital issues of its central station business.

Ground was broken in Harrisburg Feb. 1, 1885, and the current turned on to 2,000 lamps May 1, 1885, there being no less than 3,000 lamps connected at that date.

One of the important facts demonstrated by this station is that it is far preferable to start a station with a large number of consumers than to commence in a small way and work up to a fair output. It has also been demonstrated to be a more feasible plan. The fact that this station, since its inception, has been on a dividend-paying basis, speaks volumes. Special attention should also be called to the employment in this station of a great variety of lamps, which enable satisfactory terms to be made by contract, on a basis of a guaranteed satisfactory light without specifying the units to be employed, which, in such places as hotels, may be varied greatly.

DATA OF ECONOMY TESTS.

Date of test	Aug. 29 and 30, 1885.
Duration of test	12 hours.
Average boiler pressure	77.22 lbs.
Average temperature of feed water	178.47° F.
Average temperature of escaping gases	315.869° F.
Average No. of ampères	689.6
Average electrical horse power	107.35
Average No. of 10 c. p. lamps burning	1,532.44

No. of 10 c. p. lamps per indicated horse power	10.63
No. of 10 c. p. lamps per electrical horse power	14.28

Character of fuel: Mixture of one part of Clearfield bituminous (price $2.21 per ton of 2,000 lbs. delivered), with three parts of anthracite screenings (at 90 cents per ton of 2,000 lbs. delivered).

Amount of soft coal consumed	2,973 lbs.
Amount of screenings consumed	6,667 lbs.
Amount of wood was 600 lbs., equal in coal to	240 lbs.
Total amount of fuel consumed	9,880 lbs.
Percentage of moisture in coal	1.77
Dry coal consumed in test	9,705.124 lbs.
Total ashes and refuse	1,422 lbs.
Per cent. of ashes and refuse to fuel consumed	14.6
Total combustible consumed	8,283.124 lbs.
Average dry coal consumed per hour	808.76 lbs.
Total cost of fuel consumed	$6.470
Bituminous, $2.21 per ton	$3.285
Anthracite, 90 cents per ton	3.000
Wood equivalent to coal at $1.55½ per ton	.185
Total	$6.470
Total water actually evaporated under observed conditions	88,413 lbs.
Factor of evaporation	1.073
Equivalent evaporation from and at 212°	0.78857 lbs. per hr.
Water actually evaporated per lb. of dry coal	9.109 lbs.
Equivalent evaporation per lb. of combustible from and at 212° F	11.42 lbs.
Equivalent evaporation per lb. of coal from and at 212° F	6.749 lbs.
Commercial evaporation	8.2783 lbs.
Total heating surface	1,626 sq. ft.
Steam space	99.14 cu. ft.
Water space	236.66 cu. ft.
Area of grate surface, each boiler	37.43 sq. ft.
Area of chimney	1,661 sq. in.
Ratio of heating surface to grate surface	43.44 to 1
Ratio of grate surface to chimney area	3.24 to 1
Nominal horse power, rated at 11 sq. ft. of heating surface per horse power	147.8 h.p.
Dry coal actually consumed per hour per sq. ft. of grate surface	8.642 lbs.
Water evaporated per hour per sq. ft. grate surface from and at 212° F	64.271 lbs.
Average dry coal consumed per indicated horse power	5.61 lbs.
Area of heating surface	1,626 sq. ft. in each boiler.
Pounds of water evaporated from and at 212° for $1 worth of fuel	14,625.72 lbs.
No. of candles per indicated horse power	106.3
No. of candles per electrical horse power	284.31
No. of candles per hour for one cent's worth of fuel	142
Cost of fuel per h.p. per year of 365 days of 12 hrs. each	$8.92

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

To Erect the Station Meter.—The new 14-foot station meter for the plant of the Equitable Gas Light Company, of this city, will be constructed in the New York shops of the American Meter Company. These are busy times with the folks at 512 West 22d street.

Incandescent Lights in Steamboats.—It is understood that Westinghouse, Church, Kerr & Co. have been awarded a contract, by the Homer-Ramsdell Transportation Company, for the lighting of the Hudson river steamboats—Newburgh and Fishkill-on-Hudson. The Westinghouse complete system of incandescent lighting will be employed.

Reorganization of the Paducah (Ky) Gas Company.—New blood has been infused into the management of the Paducah Gas Company. From a glance over the names of those now interested in its fortunes it will be seen that our friends at Evansville, Ind., are about masters of the Paducah situation—and they may be counted upon to send things right along. The Paducah company's directors comprise Messrs. August Brentano, I. C. Baxter, R. K. Dunkerson, and Chas Reed—the latter representing the city of Paducah—with Mr. J. Eichel as President; J. A. McCoy, Secretary; A. E. Anspacher, Treasurer; and Jno. C. Maxwell, Superintendent.

No Opposition for Bridgeport, Conn.—Certain would-be public benefactors have been exerting their talents in the direction of securing the right to operate an opposition works at Bridgeport; but it seems, for the present at least, that Superintendent Gerdenier's company will remain directors of the situation. The applicants withdrew their petition on date of Thursday, Feb. 18th.

What was the Matter with the Gas?—We thought that when the Consumers Company, of Jersey City, N. J., commenced operations the residents of that section were to be regaled with a gas light possessed of an illuminating power equal to at least 25 candles. The managers thereof, at any rate, are on the record as having promised such supply; but the following, taken from the *Evening Journal*, date of Feb. 15th, shows the difference between the matters of promise and performance: "There was something wrong with the gas of the Consumers Company, on the Hill, Saturday night. The gas gave the smallest amount of light, and in several instances merchants were obliged to get out their oil lamps. This trouble was general, parties on Newark, Palisade and other avenues suffering alike, and all were indignant." It is to be supposed the candles were only temporarily mislaid.

The Keller Coke Crusher.—Mr. C. M. Keller, of Columbus, Ind., is much elated at the success which has attended his initial attempt in placing his coke crusher on the market. He says that, generally speaking, good prices are being obtained for coke throughout the West, and the outlook for a reliable and stable demand for this residual was never better than at present.

Chasing Out the Kerosene.—Brother Ramsdell, of Vincennes, Ind., like all gas men in this respect, does not look with a favorable eye on the festive kerosene; and he has been unremitting in his attacks upon the enemy. He claims that, making his comparisons with the "Fireside Electric Lamp," and oil at 15 cents per gallon, as against one gas burner consuming five cubic feet per hour, and gas at $2 per thousand (the number of hours of annual burning in each case being put at 1,413), oil can only show a saving over gas of but $1.66 per annum. In his allowance for divers matters connected with the use of oil, he estimates as follows: The "Fireside Electric Lamp" costs $2, and putting its life at five years, he has an annual charge for "prime plant" of 40 cents; his tests on the "15-cent oil" show that one gallon of that material will be consumed in 32 hours. Such rate of consumption means the employment of (during the total of 1,413 hours) 44.16 gallons, which means a charge of $6.62; chimneys he places at one (10 cents each) per month, equal to $1.20; cost of wicks is placed at 60 cents; cleaning, trimming, refilling, etc., is figured at a charge of one cent per day, or a total for year of $3.65. These items bring the kerosene side of the example up to a cost of $12.47. Gas, at $2 per thousand, for same period costs (as under the rate of burning previously noted) $14.13. The item of "matches" is set down as equal in each case—rather no mention is made of it at all; but it may be said to balance; cost of breakage of gas globes, cleansing of same, etc., may be claimed to be more than offset by reason of greater cleanliness of operation, etc. Then, again, globes, in the case of gas lights are not necessary. In fact, a much better light may be maintained without their employment. The objection offered that styles of lamps other than the "Fireside" do not consume as much oil, is met with the remark that the other "styles" do not give near so much light. Putting one thing against another, Ramsdell has made out an interesting case in the proceedings of "Gas vs. Oil," at Vincennes, and he is meeting with considerable success before the interested occupants of the jury-box—the entire population of his city. As an instance, he recites that recently gas was put into the house of one consumer who, at the beginning of the year was using more oil lights than any other single resident; and this gentleman found, upon investigation, and by reference to his first month's gas bill, that he had actually paid a higher price for the oil illumination than he was now paying for gas, without taking any account of the great increase gained in both light and comfort.

Belgium Gas Companies Feel its Encroachment.—Our English contemporary, *Engineering*, calls attention to the fact that the proprietors of Belgian gas works are beginning to seriously feel, and to fear, the competition of petroleum, which is always increasing; and some of their papers are gravely debating the question. In fact, so well are they alive to the importance of the matter that they now urge their authorities to impose a duty on all petroleum imports which will be sufficiently heavy to act as a check upon its future extension. France has already adopted such a tax, and Holland is now following suit.

Explosion of Gas—An explosion of gas occurred in the store of Messrs C. Kopf & Co., No. 50 Graham avenue, Brooklyn, N. Y., one day last February. Henry Adickes, a member of the concern, opened up the store premises at a rather early hour on the morning in question; and in order to throw some light on the subject, "struck a match." The immediate result was an outward movement of the plate glass windows, a lateral movement of the counters, and a downward movement on the part of Mr. Adickes. Perhaps $1,000 will cover the damage to property: and a judicious application of

witch hazel will restore Mr. A. to good physical condition. It is supposed that negligence in turning off the gas on the night before led to the accumulation of the explosive mixture.

How Mr. Justice Field Regards Mr. Edison—Mr. Justice Field, of the Supreme Court, is said to take deep interest in the electrical inventions and discoveries of the wizard—late of Menlo Park and Fifth avenue, but hereafter (as is currently reported) to be located in the *ci devant* Pedder castle in the Orange mountains of New Jersey. Indeed, so ardent is the Justice's belief in the Edisonian powers that the judicial mind is reported to have recently delivered the following "opinion" thereon: "I would not be surprised any day to hear that he had discovered the secret that the alchemists searched for so long, and invented some method of keeping the vital spark alive forever. The vital spark is nothing but electricity, after all." We suppose that that other eminent "discoverer," Mr. Robert Ingersoll, will soon be found quoting the above "opinion" in support of his theories put forward during the progress of those $300 per evening lectures. While superior legal minds may take great faith in Mr. Edison and the thorough efficacy and completeness of his perfected discoveries, those who are not so enthusiastic as to the wizard might be pardoned for feeling some doubt. We have all along heard how easy it was to locate leaks (when such rare happenings take place) in any portion of the Edison services fed from the central station of the down-town district of this city. They could be spotted instanter, and the particular place of defect be immediately noted. Well, perhaps so. But, under the circumstances, we are compelled to ask why it was that six men, working in two gangs, took fully 12 hours to locate a leak (on the section of conduit running down Pine street, between Nassau and William, in this city) on certain dates in the last week of February? No less than five services were stripped; but perhaps the five were leaking!

The St. Paul (Minn.) Gas Company Spreading Out.—Perhaps the busiest and most thriving city in the Union is named when the capital city of Minnesota is spoken about. Its growth, which is of the most substantial character, is really marvelous; and it would indeed be hard to predict a limitation as to the possibility or probability of its future. Keeping pace with the surroundings of its habitation, the St. Paul Gas Company strides on with the times, and with good business acumen contents itself not only with supplying the calls of the present, but puts its house in order for the demands of the future. To show how great these latter are destined to be, we need only to mention that the Company's Constructing Engineer, Capt. Wm. H. White, of this city, in accordance with resolutions passed at a recent meeting of the Directors, was instructed to prepare plans and specifications for the construction of a new retort house and gasholder. As at present contemplated the holder is to have a diameter of 100 feet, with two lifts of 36 feet each. A larger diameter would have been employed where it not for the fact that the particular site available constituted a bar to such arrangement. The retort house capacity has not been agreed upon, although we believe one-half million cubic feet per diem is a close approximation. Not content with this increase, arrangements have been made for the putting down of twelve additional miles of mains, sizes running down from 16 to 4 inches diameter. The Lake Shore Foundry folks have secured the contract for furnishing pipe, and the work of burying same will be commenced with the softening of the ground. The St. Paul Gas Company's electric lighting station, which is said to be one of the (if not *the*) most complete in the West, is in active operation; but we have no information as to the success initially attained. Due consideration being given to these matters, the St. Paul gas men may rightfully claim that they are anxious to cater to the artificial illumination needs of their city's residents.

The Alpena (Mich.) Gas Company.—In our last issue we promised with this number to give some particulars regarding the Alpena enterprise of Mr. P. DeMill, jr., and in accordance with that promise present the following "notes." Alpena is the capital seat of Alpena county, Mich., and is located at the confluence of Thunder Bay and river of same name. It is about 122 miles northeast from Saginaw City, and bids fair to be a city of considerable importance. Indeed, no better index of its rapid growth need be furnished than is conveyed by the matter-of-fact statement that the number of its inhabitants had increased from 4,000 (in 1880) to 9,210 in 1885. Young Mr. DeMill, in traveling through that section of the pine lumber headquarters of America, made up his mind to secure a franchise for the right to construct and operate a gas plant in the city on Thunder Bay. In June, 1885, the City Council granted the desired permission, and on terms very favorable to the projector. He secured the exclusive privilege to make and vend gas for a term of ten years, in return for which he was restricted to the charge of $2.50 per thousand to private consumers, and to $2 for public uses. The infant corporation was capitalized at $60,000, and a plot of land (132 × 330 feet) was purchased, situated between State street and the bay. On Sept. 1st, 1885, the ground was "stumped" (the remains of old forest monarchs were extracted) and excavations made. The building proper is a substantial brick structure 51 ft. by 31 ft., and 18 feet high, enclosed by a corrugated iron roof. Adjoining the main building comes the coal shed, 52 ft. by 32 ft. Stoutly-built dividing walls separate the different departments of the manufacturing plant. The retort house contains a bed of fives, the retorts being 12 ins. by 20 ins., and 9 feet long. The purifying department is equipped with condenser, wet scrubber, and four purifier boxes—these latter being five feet square—arranged for lime as the purifying agent. The station meter, calculated to pass 50,000 cubic feet per diem, comes next, and then we have the holder, which is 42 feet in diameter, and 17 feet in height. The distributing system, as far as completed to date of February 1st, consists of about 2½ miles of pipe, with diameters ranging between six and three inches. It should have been mentioned that the retort house also contains a steam boiler and engine, with pumping facilities calculated to furnish a water supply of 6,000 gallons per hour. The plant also has direct connection with the Alpena city water works. In fact the new company starts out with every facility for the perfect transaction of its business; and is rated to supply an output of 30,000 cubic feet each 24 hours. The hydraulic main, condensers, purifiers, and holder were constructed by Messrs. Bartlett, Hayward & Co., of Baltimore, Md.; the station meter is the work of Messrs. D. McDonald & Co., of Albany, N. Y. The Cincinnati and Newport Iron and Pipe Company, of Newport, Ky., supplied the pipe; and the Chicago Retort and Firebrick Works furnished the necessary fireclay material. The entire work was conducted under the personal supervision of Mr. DeMill; who, it is needless to add, is rather proud of the promptness and thoroughness with which his promises to the Alpena Council were carried out. Now, there is light on the shores of Thunder Bay.

Cheaper Gas at St. Louis, Mo.—As stated in our issue for Feb. 16 (in the course of "Retort's" Western notes), Mr. Wm. D. Griswold, President of the East St. Louis Gas Company, has authorized Supt. Ewing to announce that all gas consumed from date of Feb. 1 will be supplied at the rate of $2 per thousand—a reduction of 33⅓ per cent. from former ruling rates. In the city proper the Company has but 178 private consumers, and to supply these ten miles of mains are being operated. Mr. Griswold promises, when the number of consumers reaches 400, that gas will be sold at $1.75. And he means it, too.

Cheaper Gas for Scranton, Pa.—The Scranton and Hyde Park Gas Company, through Secretary Geo. B. Hand, announces that, from and after April 1 next, the following rates will become operative: Gross price, $1.60 per thousand, subject to the following discounts—10 per cent. on monthly bills showing a consumption of less than $10 worth of gas; 15 per cent. on monthly bills between $10 and $25; 20 per cent. on monthly bills in excess of $25. The discounts apply only when accounts are settled on or before 20th day from date of presentation. This notice was issued on Feb. 8. Secretary Hand is a believer in the soundness of the policy of selling gas cheaply. We congratulate the management at Scranton on their latest move.

Cheaper Gas for Meridian, Miss.—Mr. C. W. Robinson, the enterprising gentleman who really controls the fortunes of the Meridian Gas Light Company, comes forward with an announcement of a reduction in gas rates, to take effect from 1st of June, 1886. The proposed schedule is as follows:

A consumption of less than 1,000 cu. ft. per month...	$3.00	per M.
Between 1,000 and 10,000 cu. ft. per month.....	2.50	"
Between 10,000 and 20,000 cu. ft. per month.....	2.25	"
Over 20,000 cu. ft. per month.....	2.00	"

The Meridian Company has been in the field of gas supply for about three years, and this is the second concession that has been granted. The output is small, and supplies, etc., come at comparatively high figures; but the owners of the Company are determined upon "making their mark" by dealing fairly with the people. Mr. Robinson is convinced that success is sure to meet the last reduction, since he says (in the advertisement of notification) that "this reduction is announced in advance, so that parties not now using gas may have their houses piped and fixtures ordered." Not much uncertainty about that as to the way in which the reduction is expected to act.

A Batch of Eastern Reductions.—Still the evidences of progress pile up on all sides; and the epidemic of reductions appears to have taken a firmer hold and a "fresh start" in the cities and towns of the East. May the epidemic increase in virulence; for, heterodox though it may seem, the more violent becomes this disease, the less comfort and sustenance will the "undertakers" of opposition concerns receive therefrom. At Exeter, N. H., on March 1, the proprietors of the Gas Company reduced selling rates from $3.75 to $3 per thousand cubic feet. This plant is a small one, the annual output being in the neighborhood of 2½ millions. At Plymouth, Mass., on April 1, the price comes down to $2.50; which means a reduction of 25 cents per thousand. The annual sales at Plymouth may possibly foot up to 3½ millions. At Malden, Mass., also on first day of April, a big cut is made. The gross price is lowered from $3 to $2.50 per thousand, and prompt pay-

ment secures a further rebate of 25 cents per thousand. If memory does not play us false, Mr. Austin M. Copp, of Boston, Mass., has much to say in dictating business operations at the above-named places; and possibly he may forgive us for hoping that a year or so from now he will again suffer from a similar infection.

HARTFORD (CONN.) ONCE MORE APPEARS ON THE LIST.—If it can be said that other gas men are badly innoculated with the virus of low selling rates, what think you can be said of the "case" of John P. Harbison and his brother directors of the Hartford Gas Light Company. We fear that his case is beyond diagnosis, and the persistency with which his symptoms recur incline us to the belief that Harbison's recovery is hopeless; or, in the most favorable light that may be thrown upon him, in any event, he is far from approaching convalescence. We are forced to this sorrowful view from an examination of divers Hartford newspapers, bearing date of Feb. 16. These records of the hour all inform us that on the 15th ult. the Hartford Company agreed to deliver, on and after March 1st, a first-rate article of coal gas, to anybody and everybody reached by its lines of mains, at a uniform figure of $1.50 per thousand, from which gross rate a concession of 10 cents per M. will be granted to those who settle their accounts promptly. Fourteen years ago the Hartford Company charged $3; in 1876, $2.75; in 1878, $2.50; in 1879, $2; in 1882, $1.90; in 1883, $1.80; in 1884, $1.60; and now, in 1886, it is down to $1.40. Mr. Harbison needs no greater justification for his policy than is furnished by the standing enjoyed by his Company. His stockholders are enjoying an honestly earned dividend; his consumers are satisfied that they are being fairly dealt with.

STILL ANOTHER OF THE ATTACKED.—As it is with Harbison, of Hartford, so also is it with Cushing, of Lowell. Not to be outdone by any of his brethren, Mr. C. comes smilingly forward with a pronunciamento to the effect that from and after first inst., gas will be sold in the spindle city at an all-round figure of $1.30 per thousand. Brother Cushing's cheap gas symptoms made their appearance some years ago; and we fear that his and Harbison's malady will not be eradicated until the dollar limit is reached. Dollar gas does not seem so misty now as was the case ten years ago.

FLOOD TROUBLES AT TAUNTON, MASS.—The phenomenally heavy and long continued rains experienced in second week of February made great havoc among the busy cities and towns of New England. Among the other interests attacked by the rushing waters the gas works came in for a full share. We hear vague reports concerning the amount of pecuniary loss sustained at several Eastern points, but fail to give them credence since we have not heard directly from the managers of the plants spoken of. This last statement may be qualified in respect to the Taunton (Mass.) gas works, Treasurer and Supt. Leach having kindly posted us as to what had been the freshet experience in his city. On Feb. 13th, and up to 18th, the city was pretty thoroughly flooded; and on Sunday morning (Feb. 14) the water extinguished the fires in retort house. The breaking of mains passing under bridges—the latter structures to the number of four having been demolished by the swift running currents—shut off gas supply from the city late on Friday or Saturday, (the 12th or 13th), and the electric lighting station was in equally ineffective condition. However, by Tuesday (the 16th) the exertions of Mr. Leach and subordinates were rewarded through their being enabled to supply gas to the city and private consumers. A fair estimate of the damage done to the Taunton works places the loss in the neighborhood of $5,000. The Western gas men will appreciate the situation at once; and understand fully what the Eastern floods of '86 mean to those concerned in the matters of hardship, vexation and pecunary loss.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Mr. Arthur Kitson Refers Again to the "Novelties" Tests.

OFFICE, KITSON & CO.,
PHILA., PA., Feb. 13, 1886.

To the Editor AMERICAN GAS LIGHT JOURNAL:

Replying to Mr. Wilder's letter, in your issue of Feb. 2d, I wish to say that the tests of the albo-carbon light were repeated at my request. I objected to the first series of tests at the time they were being made. I was told that there were several exhibitors waiting to have their lamps tested, and the Committee could not afford to spend so much time on one lamp. I am surprised that Mr. Wilder should consider the meter he used was of "extreme accuracy." It was entirely owing to Mr. Wilder's skill in plastering the leaks with putty that it finally gave approximately correct results. When he states that this leak could not disturb its readings in the slightest degree, he forgets that the leaks were discovered merely by the readings, which showed the consumption of gas to be far more than the burner alone could possibly have consumed. It is true the Committee could not prevent the blowing of the wind; but they could have insisted on the Exhibition Committee providing them with a room, in which to conduct their experiments, properly sheltered from the weather, and in which the wind could not interfere with their tests. Likewise, they might have insisted on being furnished with suitable and accurate apparatus, instead of having to borrow a meter here, a photometer there, and a pair of scales from another party—the accuracy of which were questionable.

I am aware the awards of the Judges were not made on candle power alone. The Exhibition pamphlet states that "novelty and intrinsic merit" were to be the basis of award. If "intrinsic merit" means the ability of the invention to accomplish, in a simple and efficient manner, the results for which it was invented, Mr. Kidd, the inventor of the albo-carbon light, has been as successful in his endeavors as Mr. Frederick Siemens. My charges against the Committee of Judges, of carelessness and unfairness, were based on the facts that scarcely any precaution was taken to prevent errors; that some of the tests were made with the assistance of men who were not members of the Committee—one of whom was an exhibitor and part owner in one of the lights; that far more care was taken in measuring one or two lights than was taken with others. Lastly, that it was unfair to class the small carbon lights with the regenerative lights, which depend on the combustion of a certain *large* quantity of gas. This light was designed as a simple and effective means for increasing the brilliancy and whiteness of ordinary gas, and adapted for domestic and office purposes; which could be applied at once to existing gas fixtures. Such results the small albo-carbon light secures to the highest degree. The references made in my previous letter to the Siemens and Lungren lights were offered simply with a view to show that the albo-carbon light had not been dealt with as fairly as those lights.

I have no desire to disparage the above named lights, nor am I perturbed (as Mr. Stein thinks) over their results. I claim that the albo-carbon light is as efficient and as economical as any gas light yet produced; and, if measured exactly under the same conditions, will give, with the same consumption of gas, a highar candle power—which will more than compensate for the cost of the enriching material. The late Mr. Hartley, of London, England, made the assertion that the light produced by the albo-carbon system was undoubtedly greater than that from any other. Deducting the light due to reflection, the results of the Lungren light will be found to be no greater than those of the Siemens; all that can be said of this is that most of the rays which, in other lights, go to illuminate the roofs and ceilings of buildings are cut off and concentrated below.

This can be accomplished just as well in other burners by the use of reflectors. Mr. Stein compares the results of the small albo-carbon burner with those of his burners consuming from five to twelve times as much gas. The comparison is certainly not unfavorable to the former. A candle power of over 8, with a consumption of but 5 cubic feet of gas per hour, is certainly better than the same candle power with 50 feet per hour, adding to the former the cost of the enriching material. Mr. Stein should compare his lights with the albo-carbon *clusters*. I would advise him to compare the number of albo-carbon lights in public use with the number of his lights, both in Philadelphia and elsewhere, and he will realize it is a colder day for his lights than for the albo-carbon. Yours respectfully, A. KITSON.

The Market for Gas Securities.

The last week in February developed a rather panicky feeling amongst those holders of Consolidated gas who view with suspicion the possible legislative action that may be taken by the Albany lawmakers this spring, in regard to the methods under which the consolidation was effected. On Tuesday, Feb. 22d, the *Herald's* Albany correspondent sent down some extracts from the Senate Investigating Committee's report, which, taken all-in-all, constituted the basis of a masterly bear attack made by that shaggiest of bovine leaders—Mr. Woerishoffer. This gentleman is reported to have disposed of a large line of holdings on the mid-February rise; and rumor puts his average receipts for lot at 110. He then fostered the break, and calling to his aid those tactics, of which he is such an excellent master, drove the price down to 102 (Feb. 25), at which figure he blossomed out anew as a buyer. On the 26th, at opening of market, 27 shares were sold at 103; right afterwards Chauncey purchased 7 shares at 103, and then the Woerishoffer "boom" set in with great vigor. At close of board the bid price was 106. At opening, on 27th, 100 shares were sold at 106¼; and at time of writing (1:30 P.M., 27th) we have a record of 100 shares "turned over" at 108. It is now probable that the price will go to a notch higher than any other so far recorded. We cannot post our readers on every deal that takes place, nor can we give them daily information; but we can tell them now and here, as we have done since the stock was listed, that Consolidated is a good, solid investment. The people who adjusted the details of the consolidation knew how far they could legally proceed, and all their efforts in the matter are sure to be sustained. Furthermore, all the "windy" correspondence sent down from Albany cannot blow a slate from off a roof now owned by the Consolidated corporation. Keep your stock; it is a good thing. Equitable is quoted at 160; Mutual 137½ to 138. Brooklyn shares are somewhat firmer. Baltimore Con. is at 48, and Chesapeake is bid for at 78.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 Wall St., New York City.

March 2.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	109	109¼
Central	440,000	50	60	70
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	160	162
" New Stock			150	155
" Bonds	1,000,000	—	107	110
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	113	—
Mutual	3,500,000	100	137	138
" Bonds	1,500,000	1000	104	107
Municipal, Bonds	750,000		—	—
Northern	125,000	50	50	—
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	128	130
Citizens	1,200,000	20	88	90
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	157	159
" Bonds	300,000		104	108
Peoples	1,000,000	10	86	87
" Bonds	290,000	—	105	110
" "	250,000	—	90	95
Metropolitan	1,000,000	100	96	98
Nassau	1,000,000	25	132	—
" Ctfs	700,000	1000	101	102

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